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**AN ECONOMIC ANALYSIS OF
AID FUNGIBILITY:
JAPAN'S OFFICIAL DEVELOPMENT
ASSISTANCE TO INDONESIA**

**A Research Thesis submitted in fulfilment of the requirements for
the degree of Masters of Applied Economics at Massey University**

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STATEMENT OF SOURCES

The work presented in this study is the original and independent work of the author, except where otherwise stated or acknowledged. No part of this work has been previously submitted to this, or any other university, for the attainment of a formal qualification.



Keiju Mitsuhashi
3 February, 1997

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ABSTRACT

This study examines aid fungibility of Japan's official development assistance (ODA) to Indonesia for the period 1973 to 1994. Aid fungibility, often known as switching of aid money into non-development purposes, is one of the most controversial issues that impinges upon the macroeconomic effectiveness of foreign aid. In this study Japan's foreign aid to Indonesia is analysed, since Indonesia is one of the largest recipients of Japan's aid, and also since Japan is the largest aid donor to Indonesia.

Using the maximum likelihood cointegration econometric procedure and the error correction mechanism (ECM), the study analyses aid fungibility for non-development current expenditure, development expenditure and domestic revenue for Indonesia. The results indicate that none of Japan's total sectoral aid, other donors' total sectoral aid, and non-sectoral aid from all donors, leaks into non-development current expenditure or reduces domestic revenue. Hence, no evidence of aid fungibility at the aggregate level is found.

The study further analyses aid fungibility at the sectoral level for four major sections, i.e. social services sector, economic services sector, production sector, and other sectors. The empirical results provide no evidence that Japan's aid to the social services and production sectors is fungible. However, Japan's aid to the economic services sectors and other sectors is fungible. Furthermore, other donors' sectoral aid to all four sectors is fungible. Also, there is diversion of resources into the other sectors from other three combined sectors, i.e. social services sector, economic services sector, and production sector. This suggests that Japan's aid to the economic services sector and other donors' sectoral aid to the social services sector, economic services sector, production sector, may diverge into the other sectors. This study concludes by speculating the importance of aid sources and sectors to which aid is allocated as some of the factors that explain aid fungibility in Indonesia.

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LIST OF ABBREVIATIONS

ADB	Asian Development Bank
ADF	Augmented Dickey-Fuller
AIDS	Acquired Immune Deficiency Syndrome
APIC	Association for Promotion of International Cooperation
BAPPENAS	Badan Perencanaan Pembangunan Nasional (Ministry of National Development Planning of Indonesia)
BHN	Basic Human Needs
BPS	Biro Pusat Statistik (Indonesian Bureau of Central Statistics)
CEC	Central East European Countries
CGI	Consultative Group for Indonesia
CRS	Creditor Reporting System
DAC	Development Assistance Committee
DF	Dickey-Fuller
DGP	Data Generating Process
EBRD	East Europe and European Bank for Reconstruction and Development
ECM	Error Correction Mechanism
EPA	Economic Planning Agency
EROA	Economic Rehabilitation in Occupied Areas Fund
GARIOA	Government Appropriation for Relief in Occupied Areas Fund
GDP	Gross Domestic Product
GFS	Government Finance Statistics
GNP	Gross National Product
IDC	International Development Center (Japan)
IFAD	International Fund for Agricultural Development
IFS	International Financial Statistics
IGGI	Inter-Governmental Group for Indonesia
IMF	International Monetary Fund
JICA	Japan International Cooperation Agency
LLDC	Least Less Developed Countries
MFA	Ministry of Foreign Affairs, Indonesia
MFOA	Ministry of Foreign Affairs

MITI	Ministry of International Trade and Industry
MOF	Ministry of Finance
ODA	Official Development Assistance
OECD	Organisation for Economic Cooperation and Development
OECF	Overseas Economic Cooperation Fund
OLS	Ordinary Least Square
OOF	Other Official Flows
PPP	Purchasing Power Parity
REPELITA	Rencana Pembangunan Lima Tahun (5-year national development plan of Indonesia)
SUR	Seemingly Unrelated Regression
UN	United Nations
UNDP	United Nations Development Programme
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
WFP	World Food Programme
WHO	World Health Organisation

Chapter 1 INTRODUCTION

Fungibility is a central notion in economics, though often unnoticed and unnamed (McCloskey, 1987, p. 444).

1.1 Aims and Objectives

The purpose of this study is to examine the issue of foreign aid fungibility. Aid fungibility refers to resource substitutability where foreign aid replaces other domestically financed development funds, which would have been allocated otherwise, and which will in turn finance other project(s) or be used for other purpose(s), often more unproductive one(s). Aid fungibility is regarded as one of the most controversial issues that impinges upon the macroeconomic effectiveness of foreign aid. It elucidates that foreign aid enables recipient governments to pursue their own policies which may be independent from the original intents of foreign aid. It is essentially an argument which is used to argue how foreign aid is misused and ineffective, and hence, an argument against foreign aid. Bauer (1984), one of the critics of foreign aid, points out that since aid increases the resources and power of recipient governments, as a consequence of aid fungibility:

Aid helps or even enables governments to pursue policies which patently retard growth and exacerbate poverty (Bauer, 1984, p.46).

However, despite its *theoretical* argument, whether, in fact, aid fungibility exists or not is subject to *empirical* assessment. To date, aid fungibility has been examined based on cross-country studies, and in some cases, recipient country specific studies.¹ Recognising the influence and varying emphasis in aid provision by different donors, this study attempts to analyse the aid fungibility of a specific donor in a specific recipient country. In particular, it aims to examine the fungibility of Japan's bilateral Official Development Assistance (ODA) to Indonesia for the period 1973 to 1994. The analysis is on time-series data to examine aid fungibility of various government expenditures at a sectoral level, and domestic revenue.

¹ See Feyzioglu *et al.* (1995), Cashel-Cordo and Craig (1990), Heller (1975), Mosley (1987), Mosley *et al.* (1987), Gang and Khan (1990), and Pack and Pack (1990, 1993).

The objectives of this study are as follows: first, to examine whether total sectoral aid from Japan has a significant impact on non-development current expenditure. Second, to identify whether Japan's aid has an impact on various development expenditures at the sectoral level, and third, to test whether total sectoral aid from Japan has a significant impact on domestic revenue. These specific questions will address whether or not Japan's aid is fungible both at the aggregate and sectoral levels.

Testing aid fungibility at a sectoral level is important, since few studies have been undertaken in this area (Feyzioglu *et al.*, 1995; Pack and Pack, 1990, 1993). It is one of the unexplored areas which requires further empirical assessment, especially at a country specific level (White, 1992). The analysis of aid fungibility is also important because its assessment has a strong policy implication. Concerns over the effectiveness of aid by donors have risen especially since the late 1980s, as many of them started to reveal a tendency to reduce aid efforts, a syndrome often known as "aid fatigue" (Nishigaki and Shimomura, 1993). It is, therefore, important to measure how effectively foreign aid is being used, especially when aid is allocated for a particular purpose.

Since the late 1980s Japan has surpassed the United States and is the largest donor among the members of the Organisation for Economic Cooperation and Development. Japan contributed more than 20 per cent of total ODA provided by the OECD countries in 1992 (Gaimusho, 1995a). The importance of Japan's ODA is expected to continue as the Japanese government approved the ODA Charter 1992, which clarified Japan's active role and the direction of its foreign aid programme as one of the major foreign policy instruments (Gaimusho, 1995a).

There is an increasing consensus over the appropriateness of country specific study over cross-country study (Cassen *et al.*, 1994; Pack and Pack, 1993, 1990, White, 1992; Ram, 1987). This is because economic and political structures vary substantially between different developing countries. In this study, Indonesia is chosen as the case study to analyse Japan's foreign aid fungibility. This is not only because Japan has

been the largest aid donor to Indonesia, but also because Indonesia has been one of the largest recipients of Japan's ODA for over the last three decades (Gaimusho, 1995a).

The section below introduces some of the relevant concepts and definitions of foreign aid. Some background of foreign aid is also provided. Section 1.3 provides a brief introduction to aid fungibility. Its definition, theory and implications are addressed here, and it relates that to the importance of this study.

1.2 Foreign aid: Concepts and Measurement

1.2.1 Concepts and Measurement

It is useful to put foreign aid in perspective by introducing some of the relevant concepts and definitions of foreign aid. Foreign aid is a transfer of resources on concessional terms mainly for development purpose. Although there are private flows on a voluntary basis, foreign aid generally refers to official resource transfers on concessional terms, as it has predominantly taken place on a government-to-government basis. It is an important source of resource for many developing countries. Foreign aid comprises more than a third of the total net resource flows to developing countries (OECD, 1996a). As much as US\$59.5 billion was transferred from developed countries to developing countries and international aid organisations in 1992.²

One of the most commonly used measurements of foreign aid is Official Development Assistance (ODA), and hence, in this study, foreign aid is defined as ODA. The data on ODA is compiled systematically by the Development Assistance Committee (DAC) of the OECD, an international body which monitors aid flows. The DAC adopted the "1969 Recommendation on Financial Terms and Conditions", and defines ODA as:

Those flows to developing countries and multilateral institutions "provided by official agencies", including state and local governments, or by their executive agencies, each transaction of which meets the following tests:

² The figure refers to the amount of official development assistance (at the net disbursement level), which is explained below.

- a) it is administered with the "promotion of the economic development and welfare of developing countries as its main objective", and
- b) it is concessional in character and contains a "grant element of at least 25 per cent." (OECD, 1985, p.171)

"The promotion of the economic development and welfare of developing countries as its main objective" suggests various forms of aid flows. ODA also includes current economic support assistance, humanitarian assistance and emergency relief such as food aid. However, it is primarily for development purposes as it excludes any kind of military assistance and various types of indirect forms of aid (e.g. trade-oriented price subsidies). The criteria of the concessional term is measured by the grant element, which "is a composite measure of the financial terms of a transaction, combining in one figure the overall concessionality of the interest rate, maturity (interval to final repayment) and grace period (interval to first repayment) of a loan" (OECD, 1985, p. 172). The 25 per cent grant element ensures that ODA is provided on a concessional term.^{3, 4}

It is important to note that ODA is multi-dimensional. There are largely two forms of ODA: first, loan aid which requires repayment of the transferred fund, and second, grant aid which does not. Technical Cooperation provided through ODA assists individuals, such as teachers, administrators, and technical experts in developing countries to receive education or training at home or abroad, often comes under grant aid by its nature (Cassen *et al.*, 1994). Bilateral ODA is given directly from the donor to the recipient (government-to-government), and multilateral ODA is allocated to the recipient country by the multilateral aid agencies (e.g. Asia Development Bank, World Bank, etc.) on behalf of the donor. Moreover, there are categorical/sectoral aid that is allocated for a specific sector such as social services, economic services, and production sectors while non-categorical/non-sectoral aid is often provided in the form of programme aid or food aid.⁵

³ See Shiratori (1995, pp. 26-27) for the calculation of the grant element.

⁴ Those official flows which do not fulfil the grant element criteria do not qualify for ODA but are categorised as Other Official Flows (OOF).

⁵ There is an increasing emphasis on programme aid which generally used to support structural adjustment policy in recent years (Mosley *et al.*, 1991).

1.2.2 Foreign Aid: A Brief Overview

The inception of foreign aid can be traced back at the end of World War II in the modern history. The Marshall Plan was one of the first forms of foreign aid, initiated by the US Secretary of State George D. Marshall, to accelerate reconstruction of war-torn economies in Europe. The programme totalled \$13.2 billion over the period between 1948 and 1952, or more than 2 per cent of the US Gross National Product (GNP). It was significant in the history of foreign aid which marked the feasibility of spurring economic recovery through large-scale international cooperation (OECD, 1985). Foreign aid has predominantly taken place on a government-to-government basis, indicating its strong political dimension (OECD, 1985).

Foreign aid is now mainly provided for development purposes of developing countries rather than for reconstruction of already developed countries. This notion came shortly after the WWII. The rush for decolonisation in the "Third World" required the colonial powers to institute more systematic preparation and adjustment of their dependencies for independence. The Colombo Plan, with the British Commonwealth of Nations initiative in 1950, was introduced to promote and coordinate financial and technical assistance among the member countries of the Commonwealth.

There were initiatives from developed countries to enhance international cooperation, either as responsibility of "rich countries" or for the "mutual security" reason especially in those countries on the periphery of the communist bloc of that era. It is also regarded that some donor countries encouraged foreign aid which promoted their commercial gain through closer economic ties with their recipients. Tied aid, which was a typical form of foreign aid in the early period, promotes donor's exports to the recipient countries, and it is an apparent example of the commercial aspect embodied in foreign aid (OECD, 1985). International organisations like the United Nations, the World Bank, the International Monetary Fund (IMF) and the OECD also found importance of defining a new set of responsibilities for national governments, and sought for greater international cooperation to support the progress in developing countries.

This historical development of foreign aid also shows the importance of political and commercial interests, as well as, humanitarian concerns, which are the major objectives underlying foreign aid. Various study have analysed the aid objective and aid motivation literature. See Gounder (1995) for a review of these studies. Another important question is to examine the macroeconomic effectiveness of foreign aid. This is because a high economic performance of developing countries often serves to promote political and commercial interests of the donors, and as well as, to meet moral concerns of the donor countries. However, it is an enormous task to answer this broad question in this limited space and is beyond the scope of this study. This study attempts to investigate one of the crucial factors that may affect the macroeconomic effectiveness of foreign aid, i.e. aid fungibility.

1.3 Aid Fungibility

Aid fungibility is one of the crucial issues which is considered to impinge aid effectiveness at a macro level. Although aid fungibility is a recent but a well-known issue involved in foreign aid as “switching of aid money into uses which are in some sense unproductive” (Mosley, 1987, p. 140), there are few studies which give a precise and clear definition to the term “fungibility”. Cassen *et al.* (1994) explains aid fungibility as follows:

the argument that aid really finances, not the high-priority investments it ostensibly pays for, which “would have been carried out anyway”, but the more marginal investments (or even consumption) which aid permits the recipient to finance (Cassen et al., 1994, p. 17).

Since the focus of this study is aid fungibility at a sectoral level of the Indonesian economy, in this study, it is useful to defined aid fungibility as:

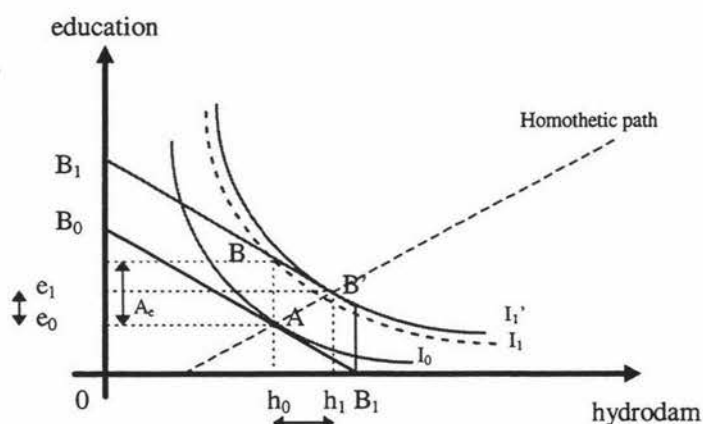
Resource substitutability where foreign aid replaces other domestically financed development funds, which would have been allocated otherwise, and which will in turn finance other sector(s) or be used for other purpose(s).

For example, aid is said to be fungible, if aid allocated for education replaces domestically financed funds, which was supposed to be used for education in the

absence of aid, and which is in turn used for a hydrodam project. This is the case of aid fungibility at a sectoral level. "Other purpose(s)" may vary from the financial support for non-development current expenditure, such as salary of public servants to the reduction of domestic revenue, mainly "tax effort".

Hence, the presence of aid fungibility reduces the effectiveness of aid by allowing the increased financial resources for other than development purposes in spite of its original intent. The graphical explanation illustrates how aid fungibility may take place, as in Figure 1.1.

Figure 1.1 Aid Fungibility: An Increase in Aid for Education



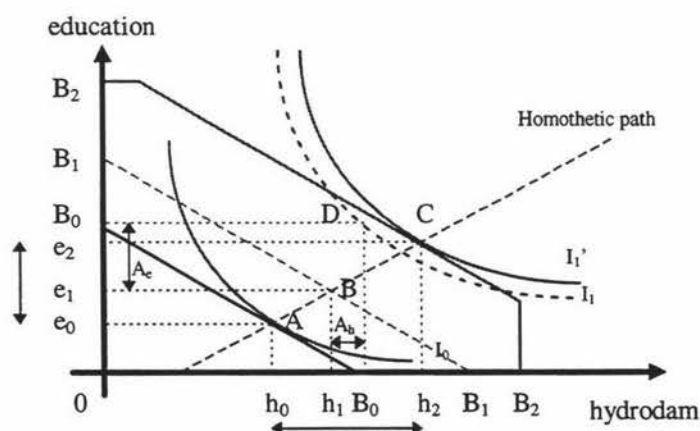
Suppose there are two government expenditures, i.e. education and hydrodam, for a recipient government. The government has the homothetic path of indifference curves with budget line B_0B_1 .⁶ Initially, equilibrium is at A, where indifference curve I_1 is tangential to the budget line at the highest possible point. Now, government receives aid for the education sector, A_e . If this aid is used according to the original purpose without affecting the other government expenditure, the equilibrium is reached at B. In this case, aid is said to be *fully non-fungible*. However, B is sub-optimal considering that the recipient could reach B' if it could use the aid to replace some of its domestically financed fund which could then be allocated to the hydrodam project so as to reach the highest possible indifference curve, I_1' . This is the case of *full-fungibility*. Any point between B and B' is, thus, the case called *partially fungible*, as

⁶ Homotheticity is a sufficient condition but not a necessary condition for the existence of at least partial fungibility.

the recipient can not fully adjust its budget according to its preference, thus sub-optimal.

The effect of aid fungibility is more difficult to be captured when there is an increase of government revenue in the presence of two different sources of aid as shown in Figure 1.2. Suppose government revenue increased as a result of a rise in national income. Also suppose that aid for hydrodam project (A_h) and education sector (A_e) are provided at the same time. With the rise in just the government revenue, the equilibrium will be at B on B_1B_1 . However, aid increases the government budget from B_1B_1 to B_2B_2 . Hence, the budget line shifts to B_2B_2 , as a simultaneous result of an increase in the budget (B_1B_1) and an increase in aid (A_h and A_e). Similar to the case with just an increase in aid to the education sector (A_e) as seen in Figure 1.1, aid is said to be *fully non-fungible* if the equilibrium is reached at D in Figure 1.2. The point C is the case for *fully fungibility*, and *partial fungibility* is the case between points C and D.

Figure 1.2 Aid Fungibility: An Increase in Aid for Education, Hydrodam, when Tax Revenue Increases



In this simultaneous case of an increase in aid and an increase in domestic revenue, especially if the latter is relatively larger than the former, it would be difficult to show whether the provision of aid is effective in increasing net expenditures in the particular sector to which aid was originally allocated, or whether aid to a particular sector merely substitutes domestic resources that the government would otherwise have spent. Similarly, it is difficult to examine aid fungibility of a particular donor in

the presence of other donors. Therefore, in reality, it is difficult to measure the precise effect of aid fungibility of a single source especially when there is an increasing tax effort by a recipient government and when there are inflows of aid from other donors.

In addition to the above mentioned difficulties of the fungibility model, it is important to note some of the other limitations. First, it should be noted that the aid fungibility model is a rather robust model, which is based on various assumptions, such as homothetic path of the utility curve, normal good nature of aid-funded projects, etc. These assumptions may not precisely reflect the reality. Second, Due to the data availability commitment data rather than disbursement data is employed in this study. This point relates to the third point, that the results obtained from this study should not be generalised for any aid programme of other developing countries. The characteristics of the aid programme and the structure of an economy vary substantially between various developing countries, and hence, further evidence from different countries is required for a generalisation on aid fungibility. Fourth, given the multiple objectives embodied in the provision of foreign aid, the presence of aid fungibility should not be used as a foundation to argue against foreign aid. Aid fungibility is a crucial factor that affect the macroeconomic effectiveness of foreign aid, however, the provision of aid needs to be addressed from multi-dimensional objectives of the aid programme, including the political and economic interests, as well as, humanitarian concerns.

1.4 Chapter Outlines

The structure of this study is as follows. Chapter 2 provides an overview of the relevant literature on fungibility of foreign aid. It attempts to address the importance of aid fungibility as a crucial factor which may impinge upon macroeconomic effectiveness of foreign aid. Chapter 3 presents the descriptive analysis of Japan's ODA and delves into the implications for fungibility study. The focus of this chapter is to provide the put Japan's ODA in perspective by examining the concept and history of Japan's ODA, and its characteristics and performances. Chapter 4 derives the model used in this study, after reviewing previous models used for testing aid fungibility. Given the importance of an appropriate econometric technique for time-series analysis, this chapter considers the application of the Johansen maximum

likelihood cointegration procedure and an error correction mechanism (ECM) of the models for aid fungibility. Data and some of its implications are also discussed. The results of the quantitative analysis are shown and discussed in Chapter 5. In conclusion (Chapter 6), it summarises the results and relates to the effectiveness of foreign aid in general. Further area of research is also discussed in the conclusion.

Chapter Two

THEORIES AND EMPIRICAL ANALYSIS OF THE MACROECONOMIC EFFECTIVENESS OF FOREIGN AID: LITERATURE REVIEW

... [I]t does seem that attempts to estimate the impact of aid on growth directly are attempts to run before we can walk (or possibly even stand) (White, 1992, p. 207).

2.1 Introduction

This chapter reviews the theoretical and empirical aid literature that is most pertinent to the study of aid fungibility. It attempts to discuss the debate on aid fungibility within the context of the macroeconomic impact of foreign aid in recipient countries. The issue of aid fungibility has increasingly received attention from many economists who attempt to explain the macroeconomic impact of foreign aid in recent years (Mosley, 1987; Eaton, 1989).

It is important to note at this stage that the general effectiveness of aid is often discussed in a broad framework, such as, improvement of general welfare and/or the poorest of the recipient country. For example, to highlight the effectiveness of aid, Riddell (1987) provides a strong case for a moral argument that "... based on addressing the needs of the poor in the Third World, ... [aid] can assist in the alleviation of poverty, directly and indirectly" (Riddell, 1987, p. 267). Even though some aid projects may not have been successful, termination of aid could exacerbate, far from improve, the conditions in the Third World, especially the poorest. Indicating the significant contribution of aid towards national income and aid impact on poverty in developing countries, Cassen *et al.* (1994) conclude that aid generally "works" despite some aid projects have failed in the past. Mosley (1987) argues that aid is a public good and justifies the continuation of aid from redistributive, allocative, and stabilisation viewpoints (Mosley, 1987, pp. 3-17).

On the other hand, critics of foreign aid, such as Bauer (1981), attack the provision of foreign aid on the ground that aid works to the detriment of economic development, favouring bureaucratic centralised states. For further right-wing arguments against foreign aid, see Bauer and Yamey (1957), and Bauer (1971, 1984). In addition to the

anti-aid argument from the right, the claim from the left is that aid hurts rather than helps the poor, perpetuating and extending international capitalism (Hayter, 1971, 1982; Hayter and Watson, 1985). For other left-wing critique, see Mende (1973) and Lappé *et al.* (1980).

In response to the theoretical debates on aid, a number of studies provide empirical results on aid motivation and allocation. See Weisskopf (1972), Isenman (1976), Edelman and Chenery (1977), McKinlay and Little (1977), Maizels and Nissanke (1984), and Gounder (1995).

In this chapter, however, the effectiveness of aid is discussed mainly in terms of its impact on the macroeconomic performance of recipient countries. The prime focus of the analysis of macroeconomic effectiveness of foreign aid lies in the impact of aid on national income, and the growth and distribution of income (White, 1992). Aid fungibility, which is an allocative issue of foreign aid by recipient governments has some important implications on national income and its growth and distribution. A comprehensive review of the entire literature on general effectiveness of aid is so vast and diverse that it is beyond the scope of this chapter. An attempt to do so may also undermine the focus on aid fungibility in this limited space.

It is important to focus primarily on the macroeconomic impact of aid also because the potential impact of foreign aid, whether positive or negative, may be substantially large. How an inflow of foreign capital can result in a noticeably large detrimental impact on macroeconomic performance can be illustrated by the case of Dutch disease (Gillis *et al.*, 1992, Chapter 15). Foreign aid, which has long been taking place since the end of World War II, and which comprises more than a third of financial resources to developing countries, would result in a significant impact on the macroeconomic performance of the recipient countries (OECD, 1996a).

This chapter is structured in such a way to review how, in the past, economists have tried to explain the macroeconomic impact of foreign aid, and discuss why macroeconomic impact is regarded as ambiguous. Section 2.2 presents the theoretical explanation for aid-growth relationship and its empirical evidence. Section 2.3

highlights the flaws and inadequacies in the previous macroeconomic studies of aid. Section 2.4 discusses aid and fiscal behaviour, particularly aid fungibility, which is recognised as having one of the most important impacts on the macroeconomic effectiveness of aid. The last section presents a summary of the literature discussed in this chapter.

2.2 Aid and Growth Relationship

The prime focus of the analysis of macroeconomic effectiveness of foreign aid lies in the impact of aid on national income, and the growth and distribution of income (White, 1992). The assessment of aid effectiveness within the macroeconomic framework is important because the provision of aid stands largely on the premises that aid eventually leads to sustainable economic growth without the need for external assistance. The belief in the strong aid-growth linkage is one of the justifications for the provision of aid, especially in the early period. Rosenstein-Rodan (1961) points out that:

The purpose of an international program of aid to underdeveloped countries is to accelerate their economic development up to a point where a satisfactory rate of growth can be achieved on a self-sustaining basis. The function of outside capital in a development program is not directly to raise standards of living in the recipient countries but to permit them to make the transition from economic stagnation to self-sustaining economic growth (Rosenstein-Rodan, 1961, p. 107).

Cassen *et al.* (1994) also argue that:

*Aid should, in the longer run, enable recipient countries to build up their productive capacity, so that they can finance their investment and import requirements through normal commercial channels (Cassen *et al.*, 1994, p. 26).*

If aid is not successful in inducing self-sustainable growth, there is a strong implication for the donors to re-evaluate their aid policies and the recipient countries to better their development policies. Various issues of aid-growth relationship are discussed below.

2.2.1 Dual Gap Model

One of the classical approaches in the literature of the macroeconomic impact of foreign aid is the dual gap model, which had its origin in the Harrod-Domar growth model. See Harrod (1939, 1948) and Domar (1947). The Harrod-Domar model essentially argues that growth is constrained by a lack of capital and that there is a required capital-output ratio for sustainable long run growth. Rosenstein-Rodan (1961) showed how aid was required to fill the savings gap in developing countries to ultimately induce self-sustained growth.

The dual gap model, introduced by Chenery and Bruno (1962), is an extended model of the savings gap model, and estimates the amount of aid required for self-sustainable growth. In addition to the savings gap, the dual gap model argues that growth is also constrained by a lack of foreign exchange (known as the foreign exchange gap or the trade gap, and thus, called the dual gap model), and technical assistance, particularly in the case for low income level countries.¹ Foreign aid can increase savings, which are required for investment, and the availability of foreign exchange. Foreign exchange is useful for purchasing foreign capital which is a crucial element for growth in developing countries due to lack of foreign exchange availability. Whether an economy is constrained by savings gap or foreign exchange gap depends on the level of development. Chenery and Strout (1966) estimate a required cumulative capital inflow of \$100 and \$173 billion (at 1962 prices and exchange rates) in order to achieve 4.4 and 5.8 per cent growth, respectively, between 1962 and 1975.²

2.2.2 Empirical Evaluation of Aid-Growth Relationship

The dual gap theory provides theoretical economic justification for developing countries to receive aid, and many developing countries have received a substantial amount of aid since the end of World War II. However, White (1992) points out that despite the fact that the cumulated amount of foreign aid alone reached \$117 billion between 1962 and 1975, the same period used for forecasting by Chenery and Strout

¹ See Chenery and Strout (1966) for a detailed introduction of the dual gap model.

² These estimates are based on the assumptions that the growth target and export performance are set as "those achievable with moderate improvements in development policies in relation to past experience" (Chenery and Strout, 1966, p. 711).

(1966), and it increased to \$191 billion between 1976 and 1988 (both figures are in 1962 prices and exchange rates), the actual growth performance of developing countries has not been satisfactory, especially in the latter period. Several African countries suffer from poor macroeconomic performances despite a substantial inflow of foreign aid (White, 1992, p. 175). Many Latin American countries have suffered from severe foreign debt crisis which has been aggravated by their stagnant economic performance. Some South Asian countries have not also performed well economically and/or provided basic human needs. This casts doubt on the effectiveness of aid on the macroeconomic performance of the recipient countries.

Moreover, the empirical aid-growth literature, which is largely based on regression analysis, varies in its conclusions, as summarised in Table 2.1. Relying on cross-country data in the 1950s and 1960s, Papanek's (1973) results show that foreign aid has a significant positive effect on growth, both when aid is a single explanatory variable, and also with other explanatory variables such as income per capita, population, domestic savings, foreign private investment and other foreign inflows. However, Voivodas (1973) and Mosley *et al.* (1987) show that aid-growth relationship is negatively correlated, but the relationship is not statistically significant.

Some studies, based on a single country evaluation of the aid-growth relationship, find no significant relationship between aid and growth. For example, using time series data on Bangladesh, Islam's (1992) results indicate that foreign resources in an aggregate form do not show any significant contribution to growth. The results also show a strong impact of domestic resources on growth than foreign resources. On the other hand, aid in a disaggregate form of loans and grant indicate that loans are more effective than grants and food aid is more effective than commodity or project aid. Similar results are obtained by Mbaku (1993) in the case of Cameroon. These empirical results suggest that despite the theory, which explains a positive relationship between aid and growth, the relationship is ambiguous, creating a discrepancy between the theory and empirical evidence with regard to the aid-growth relationship at a macro level.

Table 2.1 Aid-Growth Relationship: Selected Results

Study	Data and Method	Coefficient	Other Variables
Papanek (1973)	Cross-section (1950s and 1960s)	0.20 (3.1)** 0.40 (5.90) **	None Income per capita, (log), Population (log), Savings, Foreign Private Investment, Other Foreign Inflows
Voivodas (1973)	Cross-section (1950s and 1960s)	-0.01 (0.20)	None
Mosley <i>et al.</i> (1987)	Cross-section 1960-70 1970-80 1980-83	-0.05(2.12)* -0.03 (0.32) 0.01 (0.07)	Other Foreign Inflows, Savings, Export Growth, Growth of Adult Literacy
Gupta and Islam (1983)	Cross-section (1970s)	0.30 (2.28) *	Nine equations including demographic variables (e.g. dependency ratio, literacy rate, etc.)
Mbaku (1993)	Cameroon (1971-1990)	-182.89 (-1.34)	Savings, Investment, Population Growth
Islam (1992)	Bangladesh (1972-1988)	0.07 (0.06)	Savings, Population Growth

Notes: Figures in parenthesis are *t*-statistics.

* significant at 5 per cent level.

** significant at 1 per cent level.

All figures are rounded to two decimal places.

Sources: as shown in the Table.

2.2.3 Micro-Macro Paradox

The performance of foreign aid is also measured at the project, or micro, level. Although not all projects financed by aid are subject to performance evaluation, it is both donors' and recipients' interests to appraise individual aid projects.³ One of the most commonly employed techniques to evaluate individual aid projects is an economic method known as cost-benefit analysis. Evaluating the relative cost and benefit of a project, the cost-benefit analysis is able to indicate the return on the project.

It may not be too difficult to accept the ambiguous evidence of the macroeconomic effectiveness of aid, if a large number of aid projects at a micro-level are also shown to have failed. However, Mosley (1987) argues that a number of micro-level studies conclude that individual aid projects are generally successful. Moreover, Cassen *et al.* (1994) point out that:

³ Mosley (1987) points out that many aid agencies do not evaluate all individual aid projects, especially when projects are small and/or their analyses are highly subject to unreliable data.

... the World Bank has published reports that, for example, 80 per cent of IDA (International Development Assistance) projects achieve a rate of return of 10 per cent or more. The Asian and Inter-American Development Banks have concluded that 60 per cent of samples of their loans fully met their objectives; 30 per cent partially did so, and less than 10 per cent were marginal or unsatisfactory. Five other major agencies have conducted in-house reviews of a large number of their evaluations; while three of these studies remain confidential, they all found that the great bulk of their lending had a satisfactory rate of return (Cassen et al., 1994, p. 8).

Therefore, the discrepancy between the theoretical and empirical outcomes of aid effectiveness at a macro level appears to be more puzzling and contradictory since aid seems to “work” at a micro-level. Mosley (1987) called this contradiction the “micro-macro paradox”. The important question to ask is “why is there inconsistency between macro- and micro- level results?”.

Mosley (1987) points out that there are three potential explanations as to why the conclusions on aid effectiveness are not consistent between micro- and macro-level. These explanations are as follows: the inaccurate measurement of effectiveness; fungibility in the public sector; and backwash effects of aid on the investment and output of the private sector (Mosley, 1987, p. 139).

In addition to the points raised by Mosley (1987), White (1992) suggests that over-aggregation of the results due to cross-country approach and incompatibility in the data used between micro and macro studies may also account for the advent of the “micro-macro paradox”.

The following section discusses various studies regarding the deficiencies and difficulties in assessing the macroeconomic effectiveness of foreign aid.

2.3 Re-Evaluation of Aid-Growth Relationship

A number of flaws have been pointed out on various analyses of macroeconomic impact of foreign aid. In particular, the points raised by Mosley (1987) and White (1992) in Section 2.2 are important because each study suggests that the previous models adopted to evaluate the macroeconomic impact of foreign aid are highly

subject to unrealistic assumptions and deficiencies. This section attempts to explain several reasons why previous studies could not adequately explain the macroeconomic effectiveness of foreign aid.

2.3.1 Inaccurate Measurement

It has been suggested that the inaccuracy in measuring effectiveness of aid on macroeconomic performance obscures the empirical results. Mosley (1987) points out that some micro-level reports produced by aid agencies are biased, not because they want to hide the failing aid programmes but because they assess aid projects “at an arbitrary ‘project termination’ date when aid money is withdrawn” (Mosley, 1987, p. 140). Since self-sustained continuation of aid projects is important, some reports may overstate the average *true* return on all aid projects. Likewise, the unreliability of macroeconomic data in developing countries casts doubt on the results derived from them. The pervasive existence of underground markets and unsophisticated financial institutions in many developing countries are the major reasons. The difficulties in compiling macroeconomic data sets in developing countries can be illustrated by substantial differences between the GDP figures in the *World Tables* produced by the World Bank, using exchange rate method, and the *Penn World Tables* compiled by Summers and Heston (1996), using purchasing power parity (PPP) method (Stern, 1989).⁴ In addition, most developing countries also lack resources to collect data for their countries.

Moreover, the difficulties in measuring the macroeconomic effectiveness of aid exist because the macroeconomic data are essentially for financial purposes which are not to measure the effectiveness of aid (White, 1992). Macroeconomic figures exclude the effect of externalities, both beneficial and detrimental, which are important and most often incorporated in the micro-level assessment of the aid programme.

⁴ Stern (1989) points out that a real 1985 GDP per capita for Bangladesh in the *Penn World Tables* is \$647, while it is only \$150 in the *World Bank World Tables*.

2.3.2 Over-Aggregation in Cross-Country Studies

There is an increasing consensus among many economists that over-aggregation in cross-country studies makes it difficult to measure the effectiveness of aid in developing countries. White (1992) points out, in his critical review of the macroeconomic impact of aid, that pooling of time-series data from different countries overlooks the importance of country specificity in developing countries which can not be accounted for accurately by dummy variables in the regression equation. He also suggests that many studies have attempted to examine the effectiveness of aid using cross-section data despite the fact that one of the important findings shown in the dual gap model was the different aid requirements for different countries at different stages of development, and hence resulting in varying impacts of aid on growth (Chenery and Strout, 1966).

Consequently, many studies rely on time-series analysis based on individual developing countries (Islam, 1992; Mbaku, 1993). However, this does not imply that a positive relationship between aid and growth can be always expected in a country-specific study. In fact, as shown by Islam (1992) and Mbaku (1993), as discussed in the previous section, that aid-growth relationship can be ambiguous and inconsistent. Therefore, defining a sample of study to a single country is not sufficient to analyse the aid impact on growth. Moreover, although a time-series data on a single country is employed for the analysis of the aid-growth relationship, it is important to use a correct econometric technique. Conventional methods, employed by most time-series studies, may be subject to spurious regression, which results from lack of correct tests for time-series analysis (Rao, 1994; Charemza and Deadman, 1992; Thomas, 1992).

2.3.3 Rigid Assumptions

A criticism from a trade theory perspective is made about the structural characteristics of the dual gap model. Joshi (1970) and Findlay (1973) point out that the dual gap model suffers from unduly restrictive assumptions about the fixed production function and foreign exchange constraint, which implies that “an economy can neither increase exports (or their rate of growth) nor decrease imports (or their rate of growth)” (Joshi, 1970, p. 122). Their argument is that an increase in savings, caused by aid inflows,

leads to an improvement in the terms of trade, which in turn increases the rate of growth. The dual gap model simply assumes that structural parameters are fixed.

This implies that different results can be expected by changing from the Harrod-Domar model to a more flexible growth model as the foundation of the aid-growth relationship. White (1992) notes that when a more flexible growth model based on a Cobb-Douglas production function is used, the impact of aid is shown to be less than what is suggested by the dual gap model (Quibria, cited in White, 1992). The study by White (1990, cited in White (1992)) shows that there is no impact at all between aid and growth.

2.3.4 Backwash Effects

Macroeconomic impact on growth can not be measured by simple correlation between aid and growth because aid may produce backwash effects on the private sector. The private sector may be adversely affected by changes in exchange rates, prices and costs, which are brought about by the inflows of aid into developing countries. This indirect effect on the private sector through the market mechanism may potentially be large, as suggested by the case of Dutch disease; the discovery of major reserves of natural gas in Netherlands in the 1960s was expected to enhance primary exports, thus economic growth. However, a rise in foreign reserves, due to an excess supply of foreign currency, created dramatic inflation. Inflation was also exacerbated by a price rise in non-tradable goods in the domestic market (Gillis *et al.*, 1992, Chapter 15). Mosley (1987), however, shows that the back wash effect is not significantly important. The regression results show no statistically significant relationship between aid inflows and private investment in developing countries analysed.

2.3.5 Misspecification of Aid-Growth Model

Another major criticism is made regarding the simplicity of the aid-growth mechanism underlying the dual gap model. In particular, the assumption that all aid flows into investment which is required for growth was challenged by Griffin (1970). It is argued by Griffin that aid does no good to growth because it decreases savings, hence investment and growth. This is known as the "savings debate". Foreign aid,

perceived as an increase in income, does not lead to a one-to-one increase in savings unless the marginal propensity to save is one. The consequence of the anticipated foreign aid is that foreign aid displaces domestic savings. Many empirical evidence support the inverse relationship between aid and savings, including Griffin and Enos (1970), Areskoug (1969, 1973), Weisskopf (1972), and Chenery and Eckstein (1970).

However, the inverse relationship between aid and savings holds on volatile grounds and does not necessarily explain that aid has no positive impact on growth, if not a negative one. White (1992) points out that there is a confusion over the definition of savings, mistreatment of tied aid, and misunderstanding of the important role of aid on current consumption in developing countries. However, it is evident that Griffin posed an important insight that aid does not necessarily lead to an automatic increase in domestic savings, thus growth.

Misspecification issues in assessing the effectiveness of aid is not confined to the savings debate. White (1992) points out that it is theoretically inadequate to measure the effect of aid on growth by a simple correlation analysis when there are many simultaneous and multicollinearity problems involved in determining growth. For example, while aid may induce growth, donors may provide aid according to the level of growth attained by the developing countries, rendering aid variables endogenous. Moreover, aid could directly contribute to growth by increasing investment, or more indirectly by improving non-economic factors, such as demographic variables and education, which may, in turn, affect growth.

Gupta and Islam (1983) investigates the aid-growth relationship focusing on the simultaneous issues between aid, growth and savings. The simultaneous model adopted consists of nine endogenous variables including domestic savings rate, GNP growth rate, income per capita, as well as demographic variables such as dependency rate, total labour force, participation rate, birth rate, percentage of labour force in agriculture, infant mortality rate and female labour force participation rate, and eight exogenous variables, including aid, foreign private investment, other foreign inflows, labour force growth rate, energy consumption per capita, literacy rate, population density and number of persons per hospital bed. The results reported by Gupta and

Islam (1983) suggest that a positive relationship exists between aid and growth (See Table 2.1). However, White (1992) criticises the Gupta and Islam (1983) that inclusion of demographic variables in their simultaneous model is based on no economic relationship. White (1992) argues that the model does not consider that some of the exogenous variables, such as literacy or number of persons per hospital bed, may be endogenously determined by external capital inflows or income level. Moreover, although the study of Gupta and Islam (1983) focuses on the simultaneity of aid impact on growth and savings, their simultaneous equations are separately estimated using an ordinary least square (OLS) technique.

Moreover, there are some Japanese studies on the macroeconomic impacts of Japan's ODA, based on structural macroeconomic models of some of the major recipients of Japan's ODA in the South East Asia, allowing for simultaneity of macroeconomic variables (International Development Center (IDC), 1985, 1987, 1995).⁵ These studies estimate the contribution of Japan's ODA on income, employment, capital stock, imports, exports and foreign reserve on each recipient, by simulating the case when no Japan's ODA was provided for the period studied, after estimating reliable structural macroeconomic models. IDC (1995), which examines the macroeconomic impacts of Japan's ODA on Indonesia between 1971 and 1991, concludes that Japan's ODA had raised 3.3 per cent of GDP, 1.6 per cent of employment, 4.7 per cent of capital stock, 5.0 per cent of imports, 2.9 per cent of exports, and 7.4 per cent of foreign reserve by 1991. IDC (1995) also shows that the impacts of Japan's foreign direct investment in Indonesia were generally larger than those of Japan's ODA when a similar simulation is used.⁶

However, the simulation assumes that ODA is a source of government resource, which flows only into public investment without any influence on government current expenditure and domestic revenue. The misspecification of the model used for

⁵ IDC (1985) examines the macroeconomic impact of Japan's ODA in South Korea (1968-1982), Bangladesh (1973-1981), and Thailand (1963-1981), while IDC (1987) analyses the effectiveness of Japan's ODA in Bangladesh (1961-1981), Indonesia (1964-1982), South Korea (1963-1982), Malaysia (1960-1980), Philippines (1960-1979), and Thailand (1961-1981), and IDC (1995) in Thailand (1972-1991), Malaysia (1972-1991), and Indonesia (1972-1991).

⁶ The results show that the impacts of Japan's Foreign Direct Investment were 1.05, 1.03, 1.07 times as large as those of Japan's ODA on GDP, employment, and capital stock, respectively (IDC, 1995, p. 32).

simulation may have exaggerated the contribution of Japan's ODA in the Indonesian economy.

Thus, although the simultaneous equation approach may produce better evidence of the aid-growth relationship, it may not be appropriate unless the growth process and the mechanism through which aid affects growth is clear. The next section focuses on the issues regarding fiscal response which is one of the factors determining the macroeconomic effectiveness of foreign aid.

2.4 Aid and Fiscal Behaviour

It has been suggested that the fiscal behaviour in response to aid has an important influence on the macroeconomics effectiveness of foreign aid (Mosley, 1987; White, 1992). Because the investigation of fiscal response has not been explored by many economists, there is an increasing attention on aid and fiscal behaviour in the recent years (Gang and Khan, 1990; Pack and Pack, 1990, 1993; Mosley *et al.*, 1987). Although results are generally consistent with each other, there is a need to develop correct procedure to include the recent econometric analysis of time series data. See Rao (1994) and the literature cited therein. These issues will be incorporated in the aid fungibility model that will be reported in the later chapters.

This section first introduces fiscal response to aid inflows. The fiscal behaviour is discussed at the aggregate level focusing on the aid impact on tax revenue, consumption and investment expenditures. The fiscal behaviour at the sectoral level is discussed next.

2.4.1 Aid and Fiscal Behaviour

When a recipient government receives aid, there is no warrant that the entire aid simply transmits into capital expenditure or development expenditure, that leads to investment and growth. This is because, with the increased budget, the recipient government may want to "reshuffle" its entire fiscal pattern of all revenues and expenditures (Mosley, 1987). As a result, consumption expenditure may increase and/or tax revenue may decrease, causing no change in development expenditure,

even though aid is nominally allocated for a particular development expenditure. This can be illustrated by an example given below.

Suppose a developing country receives grant aid for a dam project administered by the central government treasury or the ministry of finance. If the finance ministry has already allocated budget for the dam project prior to the provision of aid, then the budget which is originally allocated for the dam project may be switched to some other development purposes (e.g. transportation, and education) and/or non-development purposes (e.g. recurrent expenditure for non-productive purposes, military expenditure, tax reduction, and debt reduction).

Provided that the recipient government is rational, in economic sense, i.e. utility maximiser, its interest is to reshuffle its entire fiscal behaviour so that the marginal value of using the increased budget for each expenditure and/or revenue is equal to that of using the aid fund for its original development purpose. An analogy can be found in the orthodox consumption theory (Varian, 1992, Chapter 7). In the case of the dam project, if the marginal value of a military purpose or replacing tax revenue is higher than the marginal value of allocating aid for the dam project, then the recipient government may want to reallocate the increased budget so that the marginal value of all fiscal activities are equal.

Therefore, aid fungibility, which gives the recipient government an entire control over the use of additional resources, may be used as an argument against foreign aid (Bauer, 1971). However, this is not to conclude that the presence of aid fungibility is so unacceptable as to drop any support for foreign aid. Cassen *et al.* (1994) provides several grounds in support for aid even if aid may be fungible. First, despite aid fungibility, recipient countries benefit from foreign aid which embodies technology which is not crucial for economic growth. Second, aid fungibility which allows expenditure for lower priorities may be rather important than damaging, because "in most poor countries there is a fairly endless list of valuable things that cannot be done because of lack of finance" (Cassen *et al.*, 1994, pp. 17). Third, fungible aid may allow an increase in complimentary investment which is important for overall development of developing countries. Fourth, the fungibility argument does not apply

for technical assistance, programme aid, or any aid for policy reform support, since these types of aid are not specific to a particular investment projects or sector of economy. Moreover, Cassen *et al.* (1994) argue that aid which supports consumption, not investment, is in fact, important, and hence, can not be used as an evidence of misuse or ineffectiveness of foreign aid.

Mosley (1987) speculates factors that may determine aid fungibility. He argues that the scope for aid fungibility is small when the share of the development budget which is financed by aid is large. This is because when only a small amount of development budget is financed domestically, it is this small amount that the recipient governments could reshuffle. The large share of aid in development budget suggests heavy reliance on aid, and hence, entire aid is needed for development projects. Moreover, Mosley (1987) discusses that a decline in tax effort or an increase in the ratio of recurrent expenditure to national income is accompanied with an increase in the share of aid inflows to national income, it is likely that aid is leaking into recurrent expenditure. This is most likely the case particularly if the share of development expenditure in national income is not rising at the same time.

However, the aid fungibility hypothesis is purely theoretical and whether the recipient government can and actually reshuffles its increased budget is entirely an empirical issue.

The fiscal behaviour in response to aid is often known as the aid fungibility because it refers to the situation where aid substitutes other fund which would have been used otherwise for the dam project. In this study, the substitutability of aid for these aggregate fiscal expenditure and revenue is called *aggregate fungibility* (Doriye *et al.*, 1993). The distinction between *aggregate fungibility* and *sectoral fungibility* is discussed below. Also, aid is called *fully-fungible* when entire aid substitutes for other funds which have been otherwise used. On the other hand, aid is called *partially fungible* when some proportion of aid is used for non-development purposes (Feyzioglu *et al.*, 1995).

2.4.2 Aggregate Fungibility

The main focus of aggregate fungibility is concerned with an increase in consumption expenditure and a decrease in domestic revenue in the recipient government, the latter impact often known as “Please effect” (Please, 1967). Various empirical results show that aid is generally fungible at the aggregate level, but there is a different effect when aid is provided as a grant form or loan form.

In an attempt to explain the varying aid effectiveness in different countries, Mosley *et al.* (1987) focus on the fiscal response to aid as well as its indirect effect on private investment. Based on cross-section and time-series data, they find that aid is likely to switch into consumption expenditure especially in a country where tax effort is not rising, thus aid replaces the tax revenue. In addition, they find that there is little evidence that aid discourages private investment as a result of crowding out effect, especially in the 1970s. Also, the results indicate no statistically significant aid impact on growth.

The results derived by Mosley *et al.* (1987) are similar to those obtained by Heller’s (1975) in that aid is partially fungible at the aggregate level, leaking into consumption. But Heller (1975) also finds differences in fiscal response between grant and loan aid. Using the cross-section time-series data for nine Anglophone and two Francophone African countries from the post-independence to the early 1970s, he estimates that grant aid finances consumption as well as public investment while loan aid is not used for consumption but, in fact, pulls out non-loan resources from the consumption budget to public investment. Heller (1975) also finds that grants seem to replace tax while loans replace other borrowings. Heller (1975) concludes that while his results verify the interdependence between current and capital expenditures in the presence of aid, they do not support full-fungibility of foreign aid.

The results derived by Feyzioglu *et al.* (1995), however, show the case of fully non-fungible aid at the aggregate level.⁷ Based on cross-section time-series data for 14 low- and middle-income countries between 1971 and 1990, their results show that aid is used for increasing the total government expenditure without any tax relief effect. In

⁷ The results regarding sectoral fungibility is discussed below.

the case of loan aid, the total expenditure increases by more than the increase in loans, as a result of matching requirement associated with some of the loan schemes.⁸ Their results suggest that a larger proportion of aid finances current than capital expenditure, which is contrary to the results presented by Heller (1975) and Mosley *et al.* (1987).

Empirical results are also derived for country-specific studies, which are sceptical of cross-section and time-series studies for their over-aggregation of different countries where public spending systems and economic structures significantly differ from each other.⁹ In contrast to cross-country studies, reports on individual countries studies generally support the case of non-fungibility at the aggregate level, although not all results are consistent with each other (Gang and Khan, 1990; Kumssa and Khan, 1995; Pack and Pack, 1990, 1993).

Gang and Khan (1990) examine the fiscal response to aid using time-series data for India for the period between 1961 and 1984. It is shown that neither grants or loans leak into consumption expenditure which is financed by tax revenue. They conclude that aid in India is fully non-fungible, and thus used entirely for development projects. In particular, bilateral aid pulls other resources from consumption to development expenditure.

Kumssa and Khan (1995) investigate the foreign aid and fiscal behaviour of Kenyan government for the period 1970 to 1985. Their results show that consumption is mostly financed by the tax revenue. Although a small fraction of loans leaks into consumption, a large proportion of grants and loans is used for capital expenditure.

Another important study is by Pack and Pack (1990), who examine the impact of aid on fiscal behaviour in Indonesia for the period 1966-1986. Although their main focus lies in the sectoral aid fungibility, as discussed below, they find that aid neither lead to an increase in the current expenditure nor a reduction in tax revenue.

⁸ The loan donor often requires the recipient government to raise an equal or pro-rated amount of resources on the project that is financed by the loan.

⁹ See Section 2.3.3 on over-aggregation problem in cross-country studies.

In a similar study by Pack and Pack (1993), using time-series data for Dominican Republic for the period 1968-1986, they find, however, that aid switches from development expenditures to deficit reduction, debt service, and most likely tax reduction. This results differ from their Indonesian study, where aid is hardly fungible (Pack and Pack, 1990).

Whether or not aid fungibility can be influenced by a number of factors other than the forms of aid.¹⁰ One of the important factors is the source of aid. In general, aid is more likely to be fungible when there is no restriction imposed on how it should be used by the donor. In reality, almost all aid is provided under certain conditions (i.e. tied aid and matching requirement), and hence, aid fungibility is likely to reflect the type of restriction imposed on aid and the forms of aid.

Cashel-Cordo and Craig (1990) highlight the importance of the role of aid sources in influencing fiscal behaviour. They examine the fiscal response to aid focusing on the different sources of aid using cross-section and time-series data for 46 developing countries between 1975 and 1980. Although both bilateral grants and loans do not seem to affect government expenditure, they find that grants replace tax revenue, while loans replace other borrowings. IMF (International Monetary Fund) loans which are intended to reduce the size of government are correlated with a reduction in government expenditure and tax revenue. Concessionary loans from other multilateral aid agencies seem to increase government expenditure reflecting their matching requirements.

2.4.3 Sectoral Fungibility

The varying results obtained for the aggregate fungibility, both in cross-country and country-specific studies, suggest that there is a need to address the fungibility issue at a more disaggregate level. At the aggregate level, it is possible to identify whether aid leaks into consumption or not. However, issues regarding whether aid is used for its original purpose at the sectoral level, and whether aid systematically leaks into non-productive sector(s), have not been sufficiently addressed at the aggregate level. The

¹⁰ Some studies find that aid in the grant form is more likely to leak into consumption than loans (e.g. Heller, 1975; Mosley *et al.*, 1987).

importance of the examination of aid fungibility at the sectoral level is to identify the effects of aid on different sectors (e.g. social infrastructure, economic infrastructure, etc.). Although aid is often provided to a particular sector, aid fungibility may also take place at the sectoral level for the same reason discussed for aggregate fungibility. Aid fungibility at the sectoral level is called *sectoral fungibility* in this study to distinguish it from aggregate fungibility. The analysis of sectoral fungibility explains whether sectoral aid promotes government spending for a particular sector. If aid is sectoral fungible and leaks into a non-productive sector, aid programme is less likely to be effective in promoting economic growth. Similarly, it can be said that it is not desirable if fungible aid leaks into other productive sector, because it is not the donor's intention to promote some other sector which has not been planned.

Among the limited empirical analysis of sectoral fungibility, some studies specifically examine whether aid is fungible and assists military expenditure in developing countries. Such aid fungibility is an important issue for donors' aid policy. These studies are discussed below.

Zahariadis *et al.* (1990) examine how fungible US foreign aid is for military expenditure in 84 developing countries using cross-country time-series data for the period between 1977 and 1984. They find that overall US aid does not assist military expenditure. Moreover, US aid at a disaggregate level had a statistically significant negative impact on military expenditures, except for one particular economic aid which is provided for political reasons. Other studies on aid-military linkage also confirm that aid is most unlikely to be fungible with regard to military expenditure in developing countries (Feyzioglu *et al.*, 1995; Cashel-Cordo and Craig, 1990).

Other studies investigate aid fungibility among various sectors. Feyzioglu *et al.* (1995) examine the sectoral fungibility using cross-country time-series data for the period 1971-1990, as well as aggregate fungibility. Their results show that while concessionary loans to the transport and communication sector are fully non-fungible, energy sector loans are fungible and leak into the transport and communication sector.

Pack and Pack (1990) studied the case of Indonesia for the period 1966-86 for sectoral fungibility among five sectors; agriculture and irrigation; industry, mining, electricity and power; transportation, and tourism; education, health, housing, and water; and other. Their results indicate that most aid has been used according to its intention without being converted into fungible monies. This is consistent with their findings on aggregate fungibility.

Pack and Pack (1993) also analysed the sectoral fungibility of Dominican Republic. Their results indicate that there is a substantial diversion of resources in all five sectors they examine. The five sectors analysed are as follows: agriculture; public works; president-finance; health, education, social services; and other investment. These results for the Dominican Republic differ from those derived from the Indonesian study (Pack and Pack, 1990).

2.5 Summary

This chapter discusses how economists have previously attempted to evaluate the macroeconomic impact of foreign aid in recipient countries. Despite the expected effect shown in the dual gap theory, aid does not seem to have led to self-sustainable growth in many developing countries. Econometric results do not indicate clear aid-growth relationship. A number of deficiencies and difficulties discussed explain the ambiguity in the macroeconomic effectiveness of foreign aid. Inaccuracy in macroeconomic data for the evaluation of effectiveness of aid, over-aggregation which ignores the importance of country-specific factors, rigid and unrealistic assumptions underlying the dual gap model, backwash effects on the private sector, and aid fungibility as the issue of fiscal behaviour, are considered to be the major factors obscuring the effectiveness of foreign aid at the macro-level.

Some implications can be drawn from this chapter. It is pointed out that a country-specific study is more appropriate for the analysis of aid fungibility in order to avoid over-aggregation problems associated with cross-country studies. This chapter also shows that the results on fungibility analysis is mixed to date, and further empirical assessment is important to draw a firm conclusion on the existence of aid fungibility. Moreover, there is a need to use a correct econometric technique when employing a

time-series data. Given these findings, an empirical analysis of Japan's aid to Indonesia is examined in Chapter 4, and the results are reported in Chapter 5. Next chapter presents an overview of Japan's ODA programme in order to provide the background for the fungibility analysis of Japan's ODA.

Chapter 3

AN OVERVIEW OF JAPAN'S OFFICIAL DEVELOPMENT ASSISTANCE

... [Japan's] aid to developing countries is an important pillar bolstering the diplomatic policy of Japan and is its largest vehicle for making international contribution. (Yohei Kohno, Minister of Foreign Affairs, cited in Gaimusho (1995b), preface).

3.1 Introduction

The purpose of this chapter is to provide an overview of Japan's Official Development Assistance (ODA). In 1994 Japan provided \$13.2 billion as ODA and is the largest donor among the members of the Organisation for Economic Cooperation and Development (OECD). More than 150 developing countries receive ODA from Japan. Also, Japan is the largest donor for 34 developing countries and the second largest for 29 developing countries (Gaimusho, 1995a). Adopting the ODA Charter of 1992, which marks the new direction of Japan's ODA, Japan's ODA is expected to continue to play an important role in providing foreign aid to developing countries.

This chapter attempts to examine the multi-dimensional aspect of Japan's ODA focusing on grant and loan, tied and untied aid, as well as sectoral and regional concentration of aid. It provides a descriptive statistical analysis of Japan's ODA to set the scene in the international context before drawing some implications for the fungibility of Japan's ODA, which is the main focus of this study. The various forms in which aid is given vary substantially according to each donor (Riddell, 1987). Such a diversity of aid objectives and aid disbursement seems to affect the degree of aid fungibility (Cashel-Cordo and Craig, 1990).

This chapter is set as follows. Section 3.2 reviews Japan's ODA from a historical and conceptional perspective. The major characteristics of Japan's ODA are discussed in Section 3.3. Particular emphasis is made on the volume and size of ODA relative to the donor's Gross National Product (GNP), the grant element, the tying status of aid, and the regional focus of ODA. The final Section 3.4 provides a summary and draws some implications for the fungibility study of Japan's ODA.

3.2 The Background of Japan's ODA

The origin of Japan's foreign aid goes back to 1954 when Japan joined the Colombo Plan and provided technical assistance to developing countries. The Colombo Plan started with the British Commonwealth of Nations initiative in 1950 to promote and coordinate financial and technical assistance among the member countries of the Commonwealth. It eventually expanded its activities to cover wider areas in Asia, and this enabled Japan to join the Colombo Plan. Participation in this multilateral aid programme was one of the easiest ways for Japan to gain acceptance from the Asian nations where after-war hostility against Japan persisted (Gaimusho, 1995b).

Immediately after World War II, healing antagonism against Japan was one of the most important elements of Japan's foreign policy. The first financial aid was provided in the form of war reparation to South East Asian countries in 1954, when Japan signed a peace treaty and an agreement on reparations and economic cooperation with Burma, now called Myanmar (Gaimusho, 1995b).¹ The war reparation continued until 1976, while other forms of foreign aid to Asia increased significantly. Japan provided grant aid to Cambodia, Laos, Malaysia, Singapore, South Korea, Mongolia and Micronesia. These grants were not directly related to reparations but were meant to normalise diplomatic relations with the recipient countries. In 1958, Japan extended its assistance to India under the concessionary yen loan (*en-shakkan*) scheme.² Gaimusho (1995b) explains that this marked the beginning of Japan's full-scale foreign aid commitment because it was the first form of aid which was not related to war reparations or normalisation of diplomatic relations.

The present administrative structure of Japan's ODA can be traced back to the 1960s, when the Japanese government, under the leadership of Kishi, then the prime minister, sought for more active foreign aid operation particularly in the Asian region. The Overseas Economic Cooperation Fund (OECF) was established in 1961 to administer Japan's concessionary loans to developing countries, especially to countries in Asia.³

¹ Following the agreements with Burma, the Philippines, Indonesia, and Vietnam also signed a similar agreement for reparations with Japan (Gaimusho, 1995b).

² This loan scheme was a joint-project with the World Bank (Yanagihara & Emig, 1991).

³ Kishi, the former prime minister of Japan, in 1957, proposed the Southeast Asian Development Fund that eventually brought about the Export-Import Bank of Japan and the OECF.

The Overseas Technical Cooperation Agency (OTCA) was established in 1962 to facilitate technical assistance, although it was not until 1974 that Japan established the Japan International Cooperation Agency (JICA), an aid agency which administered the operation of grant aid and the technical assistance to developing countries. The two aid agencies, JICA and OECF, now monitor the operation of Japan's bilateral foreign aid programme under the administration of four ministerial bodies. They are Ministry of Foreign Affairs (MOFA), Ministry of Finance (MOF), Ministry of International Trade and Industry (MITI) and the Economic Planning Agency (EPA).

The complex structure of Japan's foreign aid administration is largely due to the fact that the Japanese government perceived ODA as an essential part of, or often an entire operation of, economic cooperation. Official documents in the early post-war period interchangeably used "economic cooperation" and "foreign aid".

The concept of "economic cooperation" stems from Japan's own experience as a recipient of foreign aid in the early post-war period (Nishigaki and Shimomura, 1993). There was a substantial flow of aid to Japan in the forms of the Government Appropriation for Relief in Occupied Areas Fund (GARIOA), and the Economic Rehabilitation in Occupied Areas Fund (EROA) from the United States. The United States provided GARIOA and EROA, a total of \$5 billion between 1946 and 1951, in current prices, to assist Japan and Germany (Gaimusho, 1995b). Although a large proportion of assistance under the GARIOA scheme was initially used to meet the urgent procurement of daily needs, these funds were also used to finance industrial development, ranging from imports of industrial raw materials to reconstruction of economic and social infrastructures. Moreover, between 1953 and 1966, Japan received a total of 34 loans amounting to approximately \$860 million at concessionary rates from the World Bank, in current prices (Gaimusho, 1995b). These loans were again used mainly to develop economic and social infrastructure. The Japanese government recognises the significance of these funds as a crucial factor in economic cooperation which enabled Japan to reconstruct its war-torn economy.

The term "economic cooperation" was employed by the Japanese government in the early period to describe the ODA operation. By using the term "economic

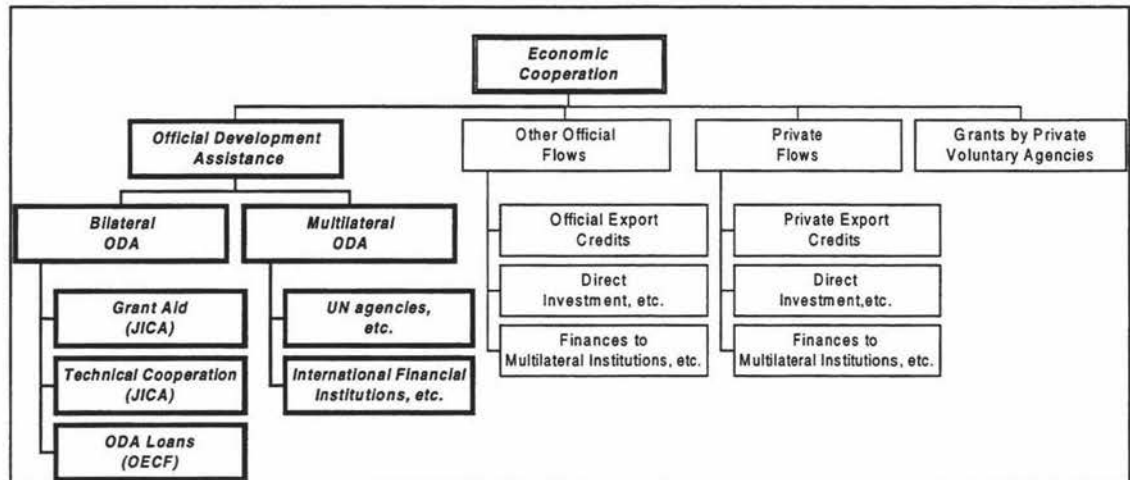
cooperation", foreign aid was considered to be based on the implicit understanding of reciprocal benefit for the participating countries, and Japan was able to reveal its commercial motive in its ODA programme without hesitation (Rix, 1993). This can be compared with using "assistance" or "aid", which strongly implies a humanitarian and altruistic perspective of resource transfer to developing countries. This mutual benefit concept of economic cooperation was one of the most important elements of Japanese foreign policy in the past. Tied aid was the norm, as it virtually meant promotion of Japan's exports to developing countries. Moreover, economic cooperation with resource rich Asian countries has been considered crucial for Japan which is poorly endowed with essential raw materials. Japan also considers economic development and political stability in the neighbouring Asian countries important for Japan because economic growth in these countries would create potential markets for the Japanese industry, and may in turn enhance Japan's own economic development (Gaimusho, 1995b).

However, it should be noted that the term "economic cooperation" in Japan does not refer only to the commercial interests of the donor. It is used as a much wider concept which also includes humanitarian concerns, in that, the main objective of economic cooperation programmes is to assist economic development of the recipient countries. The Japanese government considers that economic cooperation consists of foreign aid as one of the important factors among others such as trade, financial markets, foreign private investment, private charities, etc., all of which are considered to lead economic development. Figure 3.1 shows how ODA is incorporated as an integral part of Japan's economic cooperation.

Another important concept underlying Japan's aid programme is the "self-help" aspect of development. Self-help is emphasised because of a strong belief that there is nothing else other than the desperate effort of the government and the people of the developing country to improve their situation that leads to successful development (Nishigaki and Shimomura, 1993). Despite criticism domestically and internationally against the lack of clear underlying principles of Japan's ODA, "self-help" has been a consistent concept of Japan's foreign aid policy over time and has been incorporated in the Japan's ODA Charter of 1992 (Nishigaki and Shimomura, 1993). The "self-

help” approach is the foundation of the “request-based system”, which is another feature of Japan’s ODA.⁴ Thus, the self-help approach allows the recipient countries to use foreign aid as they see its effectiveness for development, rather than to be told by the donor what project the recipient countries can and should undertake.

Figure 3.1 Japan’s Economic Cooperation and ODA



Source: OECF (1995, p. 27, Figure 2.9)

However, Japan’s foreign aid policy is changing. In June 1992, the ODA Charter was approved by the Cabinet meeting. In response to criticism against the lack of direction and objectives underlying Japan’s ODA and to greater expectations of Japan’s ODA in a rapidly changing world.⁵ It has been clarified for the first time that the basic philosophy underlying Japan’s ODA are: (1) humanitarian consideration; (2) recognition of interdependence among nations of the international community; (3) environmental conservation; and (4) support of self-help efforts of recipient countries (Gaimusho, 1995a). Moreover, the Four-Point Principles in the Charter characterise Japan’s recent willingness to go beyond the framework of “economic cooperation” by emphasising international peace and stability and promoting democracy and the market economy, as well as human rights and preservation of the environment. See Table 3.1 for a summary of the ODA Principles. However, it is important to note that

⁴ The “request-based system” is also known as the “first-order principle” and used in contrast to the “offer principle”, where the donor country first offers a recipient an aid project which the donor wants to provide.

⁵ The end of the Cold War period undermined the political rationale of foreign aid, and many donors began to reveal “aid-fatigue” since the late 1980s.

despite the recent changes, Japan's perception of ODA as economic cooperation forms an important part of the aid programme.⁶

Table 3.1 The ODA Charter of 1992 : Summary of ODA Principles

<ul style="list-style-type: none"> • Basic Philosophy
<ol style="list-style-type: none"> 1. Humanitarian considerations 2. Recognition of interdependence among nations of the international community 3. Environmental conservation
Support of self-help efforts of recipient countries
<ul style="list-style-type: none"> • Four-Point General Principles
<ol style="list-style-type: none"> 1. Compatibility between preservation of environment and development 2. Avoidance of the use of ODA funds for military purposes and for purposes liable to inflame international conflicts 3. Monitoring of military spending of developing countries, their activities of developing and producing mass destruction weapons, and the export or import of weapons 4. Monitoring of activities for the promotion of democratisation in developing countries, and their efforts to introduce a market-oriented economy and protect the basic human rights and freedoms of their citizens

Source : Gaimusho, (1995b, p.21 and 23).

3.3 Major Characteristics of Japan's ODA

This section analyses the major features of Japan's ODA by using statistics provided by official sources.⁷ The section splits into various components in order to focus on important aspects of aid. In particular, the volume and size of ODA relative to GNP, the grant element, the tying status of aid, regional focus of ODA are examined.

3.3.1 Japan's ODA in International Perspective: Volume, and Size

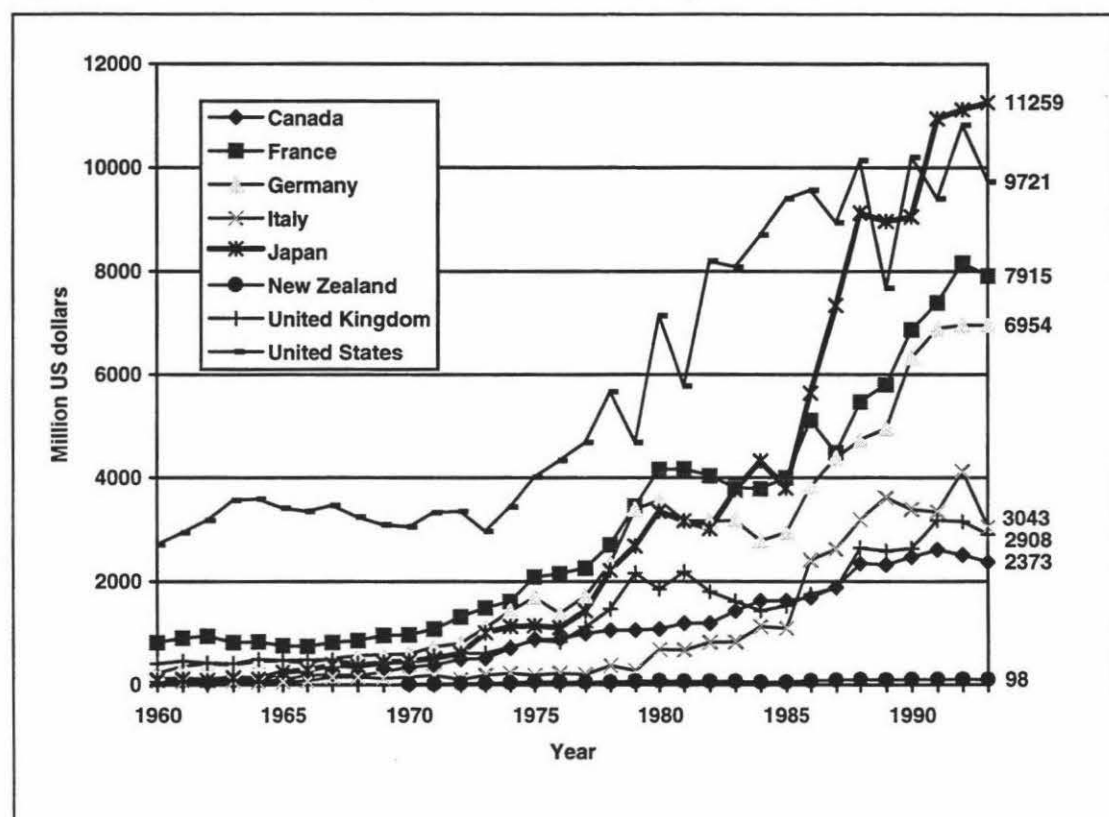
One of the most outstanding features of Japan's ODA is its relative size. Japan provided US\$13.2 billion as ODA in 1994, a share which is more than 20 per cent of total ODA from all DAC members (Gaimusho, 1995a). This amount refers to the net disbursement of Japan's ODA excluding those funds to East Europe and European Bank for Reconstruction and Development (EBRD) at current prices (Gaimusho, 1995a). The cumulative amount of Japan's ODA loans since its inception in 1958 reached 8,169 billion yen at the end of fiscal year 1994, almost half that of the World Bank group and a larger amount than the combined balances of the four major

⁶ See Gaimusho (1995a, pp. 324-367) for aid policies of other major donors.

⁷ Data are mainly derived from the Gaimusho (1995a, 1995b), OECD (1971, 1975, 1976, 1978, 1983, 1985, 1986, 1987, 1989, 1994, 1996a), and OECF (1995).

regional development banks, i.e. the African Development Bank, the Asian Development Bank, the European Bank for Reconstruction and Development and the Inter-States Development Aid (OECD, 1995). Japan has been the largest ODA donor since 1989, except in 1990 when it was second to the United States, as shown in Figure 3.2.

Figure 3.2 Official Development Assistance of Major DAC Countries : 1960-1993



Notes: Net disbursements at current prices and exchange rates.
Excluding debt forgiveness.

Sources: OECD (1971, 1975, 1978, 1983, 1989, 1994 and 1996a).

The increase of Japan's aid in the late 1980s has been substantially attributed to the rapid appreciation of the yen after the Plaza Agreement in 1985. Also, the implementation of a series of ODA medium-term objectives had a significant impact on it as well. This is indicated in

Table 3.2. Although other quantitative targets such as ODA-GNP ratio are referred to in each medium-term target, the main objective has been to expand the volume of ODA by doubling its dollar value in the period between 3 to 7 years (Gaimusho, 1995b). In spite of not meeting the target in the Second Medium-term period, the volume of Japan's ODA has consistently grown over time.

Table 3.2 ODA Medium-Term Objectives: Quantity Targets^a

Medium-Term Objective	Period	Objectives	Results
First Medium-Term Objective	1978-1980	Double ODA from \$1,424 million to \$2,848 million.	ODA increased to \$3,304 million in 1980.
Second Medium-Term Objective	1981-1985	Double the cumulative amount of ODA for 1981-85 from \$10,860 million to \$21,520 million.	The total amount of ODA provided between 1981 and 1985 was \$18,100 million, i.e. only 86.4% of the target.
Third Medium-Term Objective	1986-1992	Double the cumulative amount of ODA for 1986-92 from \$20,000 million to \$40,000 million.	The objective was achieved in 1987, due to the acceleration of emergency economic counter measures in 1987.
Fourth Medium-Term Objective	1988-1992	Provide in the 1988-92 period at least \$50,000 million which is twice the \$25,000 million provided in the 1983-87 period.	ODA in the 1988-92 period reached \$49,684 million, which was just off the objective.
Fifth Medium-Term Objective	1993-1997	Raise the amount of ODA provided in the 1993-97 period from \$70,000 to \$75,000 million.	-

Notes : ^a Each Medium-Term Objective includes qualitative targets other than the quantitative target shown, although they are not as specific as the quantitative measure. See Gaimusho (1995b) for the Fifth Medium-Term Objective.

All values expressed in the Table are in US dollars.

Source: OECF (1995).

The Japanese government tends to recognise its performance and contribution by the quantitative expansion of foreign aid. The period between 1964 and 1976 was the "period of aid expansion", followed by the "period of systematic aid expansion" between 1977 and 1988 (Gaimusho, 1995b). The motivation for this expansion is based on two aspects. It was a response to the greater expectation from the international community for an increase in Japan's ODA due to its "economic giant" status and a large current-account surplus.⁸ The emphasis on the quantitative assessment of foreign aid also stems from Japan's strong desire to be recognised as a responsible country that is fulfilling its obligations as a developed country in the international community. Restoring its international prestige has been one of the most important goals of Japanese foreign policy in the post-war period (Rix, 1993).

⁸ A proposal for structural reform to overcome the problem of growing current surplus, was indicated in the Maekawa Report of 1986, that refers to doubling Japan's ODA grants over a period of five years as one of four recommendations (Ozawa, 1989).

Although the volume of aid reflects the significance of the terms of aid programme, it explains little about the performance of the aid donor or the quality of the foreign aid. One of the most commonly used indicators of aid performance is the volume of ODA relative to the size of GNP, or ODA-GNP ratio. The Pearson Report (1969), points out that foreign aid is crucial for developing countries, and recommends that an increase of resource-flow from developed to developing countries be equivalent to 1 per cent of GNP and the ODA-GNP ratio to 0.7 per cent. In 1980, the United Nations adopted the 0.7 per cent target as one of the major goals, and which is still the foreign aid performance target today. However, many countries fall short of this target, including Japan. See Table 3.3.

Table 3.3 Official Development Assistance Relative to GNP :

Selected Years, 1960 - 1994

Net disbursements	Total ODA as a Percentage of GNP.										
Countries	1960	1965	1970	1975	1980	1985	1990	1991	1992	1993	1994
Australia	0.38	0.52	0.59	0.61	0.48	0.49	0.34	0.38	0.37	0.35	0.38
Austria	—	0.34	0.13	0.17	0.23	0.38	0.25	0.34	0.30	0.30	0.29
Belgium	0.88	0.59	0.48	0.59	0.5	0.54	0.45	0.41	0.39	0.39	0.3
Canada	0.19	0.19	0.43	0.58	0.43	0.49	0.44	0.45	0.46	0.45	0.42
Denmark	0.09	0.13	0.38	0.58	0.74	0.8	0.93	0.96	1.02	1.03	1.03
Finland	—	—	—	0.18	0.22	0.4	0.64	0.80	0.64	0.45	0.31
France	1.38	0.75	0.65	0.62	0.64	0.78	0.58	0.62	0.63	0.63	0.64
Germany	0.31	0.4	0.32	0.4	0.44	0.47	0.42	0.40	0.39	0.37	0.33
Ireland	—	—	—	—	0.16	0.24	0.16	0.19	0.16	0.20	0.24
Italy	0.22	0.1	0.16	0.11	0.17	0.31	0.32	0.30	0.34	0.31	0.2
Japan	0.24	0.28	0.23	0.24	0.32	0.29	0.31	0.32	0.30	0.26	0.29
Luxembourg	—	—	—	—	—	—	0.21	0.33	0.26	0.35	0.4
Netherlands	0.31	0.36	0.63	0.75	0.97	0.91	0.92	0.88	0.86	0.82	0.76
New Zealand	—	—	0.23	0.52	0.33	0.25	0.23	0.25	0.26	0.25	0.24
Norway	0.11	0.16	0.33	0.66	0.87	1.03	1.17	1.13	1.16	1.01	1.05
Portugal	1.45	1.59	0.45	—	—	—	0.25	0.31	0.36	0.29	0.28
Spain	—	—	—	—	—	—	0.20	0.24	0.27	0.25	0.26
Sweden	0.05	0.19	0.37	0.82	0.78	0.86	0.91	0.90	1.03	0.98	0.9
Switzerland	0.04	0.08	0.14	0.18	0.24	0.31	0.32	0.36	0.45	0.33	0.36
United Kingdom	0.56	0.47	0.37	0.37	0.35	0.34	0.27	0.32	0.31	0.31	0.3
United States	0.53	0.49	0.31	0.26	0.27	0.24	0.21	0.20	0.20	0.15	0.15
Total DAC	0.52	0.44	0.34	0.36	0.37	0.35	0.33	0.33	0.33	0.30	0.29

Note : — not available.

Sources : OECD (1971, 1976, 1986, 1994 and 1996a), Gaimusho (1995a).

Japan ranks 14 among the 21 DAC members in 1994 in terms of ODA-GNP ratio. Japan' ODA ranges between 0.15 and 0.34 per cent of GNP between 1960 and 1994, without any rising or falling trend, while the ODA-GNP ratios for other large donors, such as the United States and the United Kingdom, have dramatically declined over time. On the contrary, to the seemingly substantial efforts to expand Japan's ODA in

terms of volume spurred by its ambitious quantitative Medium-Term Targets, the ODA-GNP ratio indicates that there has been little improvement in the ODA performance by Japan. The Japanese government acknowledges this inadequateness and includes ODA-GNP ratio in its Medium-Term Targets, however, without specifying the target ratio.⁹

3.3.2 Grant/Loan Element of Japan's ODA

The grant element of aid measures the concessionality, or "softness", of a loan provided by a donor. It takes into account the financial terms of loans, i.e. the interest rates, the maturity and the grace period. This qualitative measurement of ODA is important because ODA consists of both grant and loan, and thus the concessionality conditions of aid varies according to the proportion of loan and its financial terms. See Gounder (1995) and also OECD (1985, 1987) for a detail analysis of the grant element of ODA.

Table 3.4 shows that the grant element of Japan's total ODA is the lowest among all the DAC member countries. While there are many countries whose aid is in total grant form (i.e. 100 per cent grant element), Japan remains at 76.6 per cent. The low grant element of Japan's ODA is simply due to the large proportion of ODA provided in the loan form. The grant element as a percentage of total ODA was only 43.8 per cent over 1992-93 period, second last to Spain. It is not the "hard" financial term in the ODA loans that reduces the level of grant element. The grant element of Japan's ODA loans is not particularly low *vis-à-vis* other DAC member countries. Except for Austria and Belgium whose ODA loans are associated with a high level of grant element, 83.1 and 84.3 per cent respectively, grant elements of loan aid for most of the DAC member countries are low, ranging from 27.1 to 65.9 per cent. Moreover, the grant element of Japan's ODA to least less developed countries (LLDCs) is 96.2 per cent, indicating that the Japanese government provides ODA with a high level of concessionality to poorer countries. This is the reflection of the belief of the Japanese government that it is appropriate to set the level of concessionality of foreign aid

⁹ See Gaimusho (1995b, p. 252).

according to the level of economic development of the recipient countries, which is important to enhance the self-help attitude of development in the recipient countries (Gaimusho, 1995a).

Table 3.4 Financial Terms of ODA Commitments : 1992 - 1993 average

Commitments				Percentage.	
Countries	1992-93 average				
	Total ODA			ODA Loan	ODA to LLDCs
	GE ^b	(Rank)	Grant Ratio	GE	GE ^c
Australia	100	(1)	100	-	100
Austria	88.1	(18)	72.8	56.3	96.7
Belgium	99.5	(8)	97	83.1	99.7
Canada	99.3	(11)	95.7	84.3	100
Denmark	99.8	(7)	99.8	..	100
Finland	90.4	(17)	82.3	46.1	100
France	87.5	(19)	74.8	50.3	98.7
Germany	92.7	(15)	80.2	63.3	100
Ireland	100	(1)	100	-	100
Italy	92.6	(16)	80.9	61.4	99.5
Japan	76.6	(21)	43.8	58.4	96.2
Luxembourg	100	(1)	100	-	100
Netherlands	99.5	(8)	98.4	50.6	100
New Zealand	100	(1)	100	-	100
Norway	99.5	(8)	99.3	27.1	99.5
Portugal	98.6	(13)	97.3	..	96.2
Spain	80.3	(20)	42.3	65.9	97.4
Sweden	100	(1)	100	-	100
Switzerland	100	(1)	100	-	100
United Kingdom	96.5	(14)	92.2	54.9	100
United States	99.1	(12)	97.9	58.6	99.8
<i>Total DAC</i>	<i>90.6</i>		<i>77.1</i>	<i>58.7</i>	<i>99.2</i>

Notes : ^a Excluding debt reorganisation.

^b Countries whose ODA as a percentage of GNP is significantly below the DAC average are not considered as having met the terms target (Normal 86%). This provision disqualified New Zealand, Portugal and the United States in 1993.

^c Including imputed multilateral grant element. Alternative norm : the grant element to each LLDC should on average be at least 86 per cent over a period of three years. In 1993, all countries met this provision, with respect to the period 1991-93.

Source : OECD (1996a).

There are three main reasons for the large proportion of loans in the Japan's ODA programme. First, Japan's ODA, as a part of "economic cooperation", has a commercial focus. Second, a large proportion of loans is attributed to the way in which the Japan's ODA is financed. Having a "small government", the amount extracted from the general budget is highly limited (Nishigaki and Shimomura, 1993). Consequently, 44.2 per cent of Japan's ODA was budgeted through government bonds, fiscal investment and the loan programme in 1995 (Gaimusho, 1995a).

Borrowing funds from the private sector necessarily incurs costs. This financial structure reflects the cost of borrowing in terms of loans. Third, the “self-help” approach is a part of Japan’s ODA, thus the recipient countries play an active role in the development process. Loan schemes are considered to provide recipient countries with an incentive to utilise the borrowed funds efficiently and effectively so as to repay the loan.

3.3.3 Tying Status of Japan’s ODA

Tying of aid is also an important aspect in assessing the quality of ODA. Tied aid refers to aid funds which are used to purchase goods and services in the donor country (Gounder, 1995). This is one of the ways in which a donor encourages its commercial interests, by tying aid to its exports. Although aid enables a recipient country to acquire crucial resources/technology from the donor country, it is often argued that the donor’s commercial motive of tied aid is likely to be inefficient to promote economic development of the recipient country (Jepma, 1991).

The tying status of aid of all individual DAC member countries for 1992 is shown in Table 3.5. The share of tied aid to total aid is 12.5 per cent in 1992 for Japan, the 5th lowest in terms of ranking, and is well below the total DAC of 25.4 per cent. The tying status of Japan’s aid is smaller if we do not take into account the tied aid through technical cooperation. Technical cooperation is by nature tied, while grant and loans are not.¹⁰ Moreover, the tying status of Japan’s loans is outstanding, i.e. 98.3 per cent of the loans were untied and 1.7 per cent were partially untied (Gaimusho, 1995a). However, the tying status is reported at the commitment level.

Ensign (1992) argues that at the procurement level, Japan’s aid is tied with the Japanese commercial sector in spite of the high percentage of untied aid in the commitment-based official statistics. This issue exists because it is possible for a Japanese firm to bid for ODA projects under the untied status. While 100 per cent of Japan’s loans are either untied or partially untied, 27 per cent of loan contracts are

¹⁰ Technical Co-operation refers to foreign aid under which developed countries provide their expertise and/or training and technology to developing countries.

received by Japanese enterprises in fiscal 1994 (OECD, 1995). However, although tied status at the procurement level is higher than at the commitment level, there is a declining trend of Japanese firms undertaking the aid projects (OECD, 1995).

Table 3.5 Tying Status of ODA by Individual DAC Members : 1992

Commitments (excluding administrative costs but including debt reorganisation) Per cent of total ODA of each donor.

Countries	Bilateral ODA				Multilateral ODA	
	Untied ^a	Partially untied ^b	Tied ^c		Total excl. CEC	CEC only
			Total	Tied-TC		
Australia	29.5	..	50.5	30.1	20	..
Austria	72.1	0.1	18.6	1	9.3	..
Belgium	9.7	2.4	50.8	..	18	19.2
Canada	26	11.8	29.2	3.6	33	..
Denmark	..	..	..	..	37.6	8
Finland	39.5	2.5	36.1	7.6	21.9	..
France	34	2.8	39.3	18.3	13.6	11.6
Germany	31.3	..	38.6	..	14	16.1
Ireland	..	..	..	..	..	..
Italy	17	1	43.3	3.8	21.7	16.9
Japan	58.5	8.5	12.5	12.4	20.3	..
Luxembourg	37.7	8.2	9.2	1.4	18.5	24.2
Netherlands	20.9	45.7	9.2	1.7	21.8	9.6
New Zealand	69.6	..	..	..	30.4	..
Norway	46.4	..	10.4	3.2	43.2	..
Portugal	1.7	..	49.4	44.6	8.7	40.3
Spain	..	..	58.4	..	27.5	..
Sweden	63.6	..	10.9	2.2	25.4	..
Switzerland	51.9	6.5	22.2	6.8	19.4	..
United Kingdom	17.7	..	35.5	23.5	16	19.5
United States ^e	61.4	10.2	17	11.8	11.4	..
Total DAC	43.7	6.9	25.4	9.7	17.9	6

Notes : ^a Fully and freely available for essentially world wide procurement.

^b Contributions available for procurement from donor and substantially all developing countries.

^c Mainly aid tied to procurement in the donor country, but also includes amounts available for procurement in several countries, but not widely enough to qualify as "partially untied". TC refers to Technical Cooperation.

^d CEC refers to Central East European Countries.

^e Data are for 1991.

Source : OECD (1996a).

3.3.4 Regional and Sectoral Focus of Japan's ODA

Another important aspect considered here is the sectoral focus of Japan's ODA. The sectoral allocation of Japan's aid can be characterised by its substantial bias towards the economic services and production. The economic services and production sectors accounts for more than a half of Japan's aid in 1992. The high concentration of Japan's ODA in the economic services sector is attributed to Japan's post-war experience when Japan allocated substantial amount of foreign aid to the development

of economic services that is regarded as a crucial factor for economic success (Nishigaki and Shimomura, 1993). Also, Japan's aid allocation and the focus on the Asian countries is towards the economic services and production assistance than the humanitarian and social aspects. Table 3.6 indicates the sectoral distribution of Japan's ODA.

Table 3.6 Sectoral Distribution of Japan's Bilateral ODA : selected years

Commitments	Per cent of total bilateral ODA.					Tot. DAC 1992
	1975	1980	1985-6	1991	1992	
Sectors						
Social and administrative Infrastructure	2.8	7.4	18.5	12.3	17.5	21.1
Education ^a	1.5	2.7	8.1	6.3	6.3	8.4
Health and population	0.7	2.7	3.7	1.6	1.8	3.7
Planning and public administration	0.4	0.3	0.7	0.4	1.5	2.9
Other (incl. water supply)	0.2	1.8	6	3.9	7.9	6.1
Economic Infrastructure	39.4	52.1	37.3	40.7	27.4	14.3
Transport and communication	—	—	22	25.2	15.2	7.6
Energy	—	—	12.3	14.9	9.8	5.5
Other	—	—	3	0.6	2.4	1.1
Production	25.3	21.0	26.6	17.4	27.2	14.9
Agriculture	6.5	10.2	14.2	9.4	13.6	7.6
Industry, mining and construction	16.9	9.6	10.9	3.3	9.8	5.3
Trade, banking, tourism	1.9	1.3	0.6	4.7	3.8	1.7
Other	2.4	1.5	0.9	..	..	0.2
Multi-sector	2.4	4.0	1.7	0.9	1.1	3.5
Programme assistance	13	5.2	8.3	19.9	10.8	10.4
Debt relief ^b	14.5	0.2	3.2	2.7	6.2	14.7
Food aid	..	7.6	1.4	0.3	0.4	3.6
Emergency aid (other than food aid)	0.1	0.2	0.1	..	1.9	5.1 ^c
Administrative expenses	0.1	0.0	2.9	2.9	3.8	2.9
Unspecified + Support to Private Voluntary Agencies	..	0.8	0	2.9	3.6	9.5
Total	100	100	100	100	100	100

Notes : ^a Including students and trainees.

^b Including debt forgiveness of non-ODA debt.

^c Excluding non-reporting countries.

— not available.

Sources: OECD (1976, 1978, 1986, 1994 and 1996a).

Ensign (1992) points out that the concentration of aid in the economic services and production sectors is a reflection of Japan's commercial interest of the aid programme. Project aid to these sectors allows Japanese firms to expand their overseas market for commercial benefits. For example, more than 70 per cent of Japan's ODA was allocated through economic services and production in 1975 and 1980, thus it may reflect that Japan has a stronger commercial interest in the early period.

The sectoral distribution of Japan's ODA has changed in recent years to take into account the OECD perception of aid focus. As the economic conditions in developing countries change and new areas of need for aid are identified, the Japanese government has sought to diversify its aid programme (Gaimusho, 1995a). In particular, there is a greater emphasis on the environment, population, AIDS (Acquired Immune Deficiency Syndrome), and gender and development. Recognising the lack of emphasis in the social and administration sector, especially the education, Japan has increased aid to this sector and exceeded 20 per cent of total ODA allocation in 1994 (Gaimusho, 1995a).¹¹

Japan's ODA is also characterised by its regional focus in Asian countries. Since its inception, Japan's aid programme has mainly concentrated to the Asian region. The Japanese government made clear that the central focus of the aid programme lies in Asia, especially under the Kishi regime in the late 1960s and Fukuda Doctrine in the late 1970s (Gaimusho, 1995b). Stronger relationships with Asian countries enabled Japan to secure resource supplies and overseas markets for Japanese industry. The government argued that economic links with Asia should be strengthened by providing aid to Asian countries.

In 1994, almost 30 per cent of bilateral aid in the grant form was allocated to Africa, which received only 11.8 per cent of the total ODA, while 57.3 per cent of total ODA were allocated to Asia (see Table 3.7). The aid bias towards Asia is greater in the Japan's loan programme. In the fiscal year 1994, 90 per cent of loans were provided to Asian countries. Only 4 per cent of Japan's loans were received by African countries, while 3.7 per cent by Central and South American countries in the same year (OECD, 1995). There is also bias within Asia: i.e. between North East Asia, South East Asia, South West Asia and others.

However, there has been a shift towards greater emphasis on LLDCs (Least Less Developed Countries), particularly the Sub-Saharan African countries, due to an urgent need for foreign aid to ensure Basic Human Needs (BHN). In 1994, LLDCs

¹¹ "20:20 Agreement", which was declared at the World Summit for Social Development in Copenhagen in 1994, states that developed countries allocate 20 per cent of their aid and developing countries distribute 20 per cent of their public expenditure for basic social programme.

received 52.4 per cent of total ODA (general) grants from Japan, compared with 33 per cent in 1988 (Gaimusho, 1995a).

Table 3.7 Regional Distribution of Japan's Bilateral ODA : selected years

Commitments	Total Bilateral ODA						Per cent of bilateral ODA.		
	1980	1985	1990	1992	1993	1994	1994		
							Grant	Tech Ass.	ODA Loan
Asia	70.5	67.7	59.3	65.1	59.5	57.3	45.8	37.8	77.6
North East Asia ^a	4.2	15.3	12.0	13.7	17.7	15.5	6.0	12.8	22.8
South East Asia ^b	43.9	37.6	34.3	39.6	29.9	23.0	20.6	19.6	26.7
South West Asia ^c	22.2	14.7	12.9	11.7	11.7	18.2	19.2	4.8	27.1
Central Asia ^d	—	—	—	—	0.0	0.5	0.0	0.3	0.9
Caucases ^e	—	—	—	0.1	0.0	0.0	0.0	0.0	0.0
Other Asia	0.3	0.1	0.1	4.3	0.2	0.1	0.0	0.3	0.0
Middle East	10.4	7.9	10.2	10.1	6.4	7.8	9.0	4.0	9.7
Africa	11.4	9.9	11.4	9.1	11.8	11.8	29.2	7.0	5.4
Central & South America	6.0	8.8	8.1	2.0	9.0	8.6	7.8	11.1	7.2
Oceania	0.6	0.9	1.6	1.2	1.7	1.3	3.0	2.0	-0.1
Europe	—	0.0	2.3	1.2	1.5	1.4	3.7	1.3	0.2
East Europe	—	0.0	2.2	1.2	1.5	1.2	3.7	1.1	0.0
Unidentified ^a	1.2	4.8	7.1	8.2	10.0	11.9	1.4	36.9	0.0
Total	100	100	100	100	100	100	100	100	100

Notes : ^a North East Asia includes China and Republic of Korea.

^b South East Asia includes Brunei, Cambodia, Indonesia, Laos, Malaysia, Mongolia, Myanmar, Philippines, Singapore, Thailand, and Vietnam.

^c South West Asia includes Bangladesh, India, Maldives, Nepal, Pakistan, and Sri Lanka.

^d Central Asia includes Kazakhstan, Kyrgyz, Tadjikistan, Turkmenistan and Uzbekistan.

^e Caucasus includes Armenia, Azerbaijan, and Georgia.

^f Unidentified refers to projects and/or programmes which carry across regions and hence the region can not be identified.

— not available.

Source : Gaimusho (1995a).

3.4 Summary and Implications

This chapter presents various descriptive statistics of Japan's ODA. Although Japan is the largest aid donor in absolute terms, its ODA relative to its GNP is not outstanding. In fact, the ODA-GNP ratio of Japan is below the total DAC average of the member countries. It should be recalled that the major focus of aid has been in terms of economic cooperation concept and self-help approach in the Japanese aid programme. There is an element of promoting mutual benefit through economic cooperation. Japan's ODA indicates the sectoral bias towards economic services and production, as well as the regional bias towards Asia, especially in the ODA loan programme. Developing countries in Asia are the main focus for the development and improvement of the economic services and production sectors. Projects on economic services and production tend to be large, thus is difficult to finance these funds

without relying on loans. To compensate for the low grant element of total ODA, which is attributed to a large share of loan in total ODA, Japan has attempted to reduce the proportion of tied aid. However, the economic cooperation approach is declining in recent years. The ODA Charter of 1992 marks the changes in the operation of Japan's ODA programme, and gives more consideration on international peace, stability, promoting democracy and the market economy, as well as human rights and preservation of the environment.

These findings raise several implications for the analysis of aid fungibility. First, it is important to note that the large proportion of Japan's aid is provided in the form of loan. Although inconclusive, loan aid seems to have an impact different from grant aid, as discussed in Chapter 2. However, loan aid, which is generally associated with tighter matching requirements, and which finances larger projects, seems to be a less fungible source of resources. Second, the concentration of Japan's aid in the economic services and production sectors seems to suggest that less fungibility is expected in these two sectoral categories. As discussed in Chapter 2, the larger the share of aid in the development expenditure, the smaller is the scope for aid fungibility. Third, the request-based system seems to prevent resource reallocation since aid is already provided according to the intention of recipient countries. The issue of aid fungibility will be analysed in the next chapter.

Chapter 4

FOREIGN AID FUNGIBILITY: THEORETICAL MODEL, DATA, AND SOME IMPLICATIONS

The theoretical and empirical analysis of cointegrated systems is a rapidly developing and highly exciting field. (Engle and Granger, 1991, p. 15).

4.1 Introduction

The purpose of this chapter is to provide a theoretical framework for the empirical analysis of foreign aid fungibility. As discussed in Chapter 2, testing the aid fungibility issue provides an important foundation for further assessment of the macroeconomic impact of foreign aid. This study focuses on aid fungibility of Japan's Official Development Assistance (ODA) in Indonesia.

Foreign aid has been an important source of revenue for the Indonesian government besides two other main types of revenue, i.e. oil and gas domestic revenue, and non-oil domestic revenue (Hill, 1996). Although the ratio of ODA to Gross National Product (GNP) was 1.3 and 1.0 per cent for 1980 and 1994, respectively, foreign aid has comprised more than 20 per cent of government development expenditure for more than three decades in Indonesia (World Bank, 1996; Asian Development Bank (ADB), 1995). In particular, Indonesia has been the largest recipient of Japan's ODA which comprises about a half of the total foreign aid it receives (Gaimusho, 1995a). The importance of foreign aid, especially the significance of Japan's foreign aid, is one of the reasons for choosing Indonesia as the case study of aid fungibility analysis. Moreover, this study also provides a comparison of the results with that of Pack and Pack (1990), who examined the sectoral aid fungibility in Indonesia.

Furthermore, compared with a cross-country study, a country-specific study is appropriate for aid fungibility analysis, because it takes into account the country specific factors which substantially vary among developing countries (White, 1992; Cassen *et al.*, 1994). See also Ram (1987).

Since the analysis involves time-series data from 1973 to 1994 for Indonesia, it is appropriate to apply the technique of cointegration to test for the stationarity of the annual data. For a discussion of this issues see Cuthbertson *et al.* (1992) and Rao (1994). The traditional econometric technique which assumes *a priori* stationarity of the variables is highly susceptible to spurious regression (Charemza and Deadman, 1992). The cointegration technique may also identify a long-run relationship as well as a short-run dynamic relationship between foreign aid and fiscal behaviour of the recipient country, if it exists.

This chapter is structured as follows. First, it provides an overview of the Indonesian economy focusing on the government fiscal budget and foreign aid. This descriptive analysis provides some general implications of foreign aid, particularly, Japan's ODA, as an important financial resource in Indonesia. Section 4.3 examines the theoretical background of aid fungibility. The models that will be estimated in the next chapter is discussed in Section 4.3.1. Section 4.3.2 presents the data and some implications. The final section presents the summary and conclusion of this chapter.

4.2 The Indonesian Economy and Foreign Aid: An Overview

Indonesia is a rapidly growing economy with a population of over 190 million in 1994 (World Bank, 1996). It is often appraised as one of eight high performing Asian economies in *The East Asian Miracle* (World Bank, 1993).¹ Indonesia has more than trebled its real per capita Gross Domestic Product (GDP) in one generation since 1966, reaching US\$1,023 in 1994 (Biro Pusat Statistik (BPS), 1996). A large part of the successful growth can be attributed to the reform of the fiscal economic policy adopted since the inception of the New Order regime in 1966 (Bresnan, 1981).² The Indonesian fiscal economic policy is three-fold: to ensure macroeconomic stability; to reduce dependence on foreign aid; and to improve income distribution (Hill, 1996).

Macroeconomic stabilisation policy has restricted the government to pursue reckless government expenditure which had been the major contributor of hyperinflation prior

¹ The eight economies are Hong Kong, Indonesia, Japan, the Republic of Korea, Malaysia, Singapore, Thailand, and Taiwan.

² Bresnan (1981) provides a detailed analysis of the emergence of the New Order regime in Indonesia.

to 1966. The Indonesian government introduced the “balanced budget” policy that set priorities for economic growth by adopting a selective “industrial development policy”. This is reflected in a series of 5-year national development plans called *Rencana Pembangunan Lima Tahun*, or *REPELITA*, in which the emphasis is made on infrastructure in agriculture and transport, etc. (Badan Perencanaan Pembangunan Nasional (BAPPENAS), 1996). However, the “balanced budget” rule does not strictly prohibit government expenditure from exceeding government revenue. The government has always considered foreign aid a source of “revenue”, as opposed to “borrowing abroad” which is a result of fiscal deficit (Hill, 1996). Consequently, this contributed to the external debt crisis in 1986/87, by technically running budget deficits, which has been “balanced” by the continuous inflows of foreign aid.³

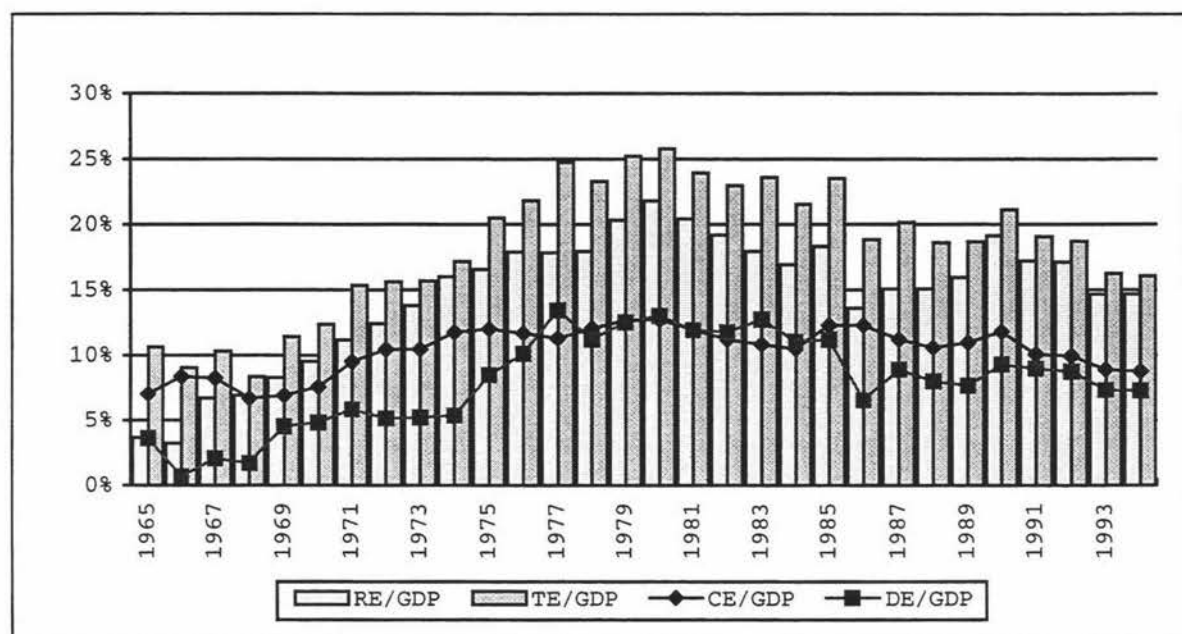
Moreover, the “balanced budget” has not discouraged the government sector from expanding its size. The unanticipated oil boom in the 1970s increased government revenue. This effectively enabled the government to increase government expenditures at a rate faster than the increase in GDP (Hill, 1996). This resulted in doubling the share of government expenditure in GDP from 9 per cent to 20 per cent over the 1966-1975 period, and almost trebling over the 1966-80 period, reaching 26 per cent. See Figure 4.1.

The second fiscal policy relates to a shift away from foreign aid dependence. This shows the government’s intention to increase its domestic revenue that substitutes foreign aid. Hill (1996) points out that the dependence on foreign aid was significantly large around 1970, when more than 70 to 75 per cent of the development budget was financed by aid. This situation arose largely due to the provision of programme aid that formed a crucial source of revenue in the difficult adjustment period in the late 1960s. Aid dependence seemed to have lessened in the mid-1970s due to increased oil revenue that substituted foreign aid, and it comprised over half of government revenue during the oil boom era (Hill, 1996). However, the share of foreign aid in the development expenditure between 1973 and 1986 was still over 20 per cent which has been due to a decrease in non-oil domestic revenue. At the sectoral level, foreign aid

³ External debt increased dramatically between 1980 and 1986, as a fall in oil prices eroded export earnings and the value of yen rapidly appreciated after the Plaza Accord of 1985 (Hill, 1996).

has been an important source of revenue, especially, in the economic services and production sectors, comprising 16.38 per cent and 21.56 per cent of development expenditure, respectively, during the period 1973-1986. This has also been the case in the later period, 1987-1994. See Tables 4.1 and 4.2.

Figure 4.1 Government Expenditure and Revenue as a Percentage of GDP: 1965-1994



Notes: *RE* is domestic revenue, *TE* is total expenditure, *CE* is non-development current (routine) expenditure, and *DE* is development expenditure.

Sources: ADB (1995), IMF(1982), and IMF (1996).

The end of the oil boom led to a decline in the oil revenue in the early 1980s, and the shortfall in tax revenue was supplemented by programme aid. Japan's aid in the late 1980s were mainly directed towards tax revenue (Hill, 1996). The increased importance of foreign aid as a source of revenue is also illustrated by an increase in the share of development expenditure funded by foreign aid, i.e. 20.03 per cent in the period 1973-1986 to 25.26 per cent in the period 1987-1994, as shown in Tables 4.1 and 4.2.

Table 4.1 Composition of Sectoral Aid in Indonesia: 1973-1986^a

	<i>Social Services</i>	<i>Economic Services</i>	<i>Production</i>	<i>Other Sectors^b</i>	<i>Programme Aid^c</i>	<i>Total of Development Expenditure^d</i>
<i>Grant ODA from Japan</i>	0.29%	0.00%	1.23%	-	0.09%	0.44%
<i>Loan ODA from Japan</i>	1.63%	7.10%	11.29%	4.65%	1.37%	8.00%
<i>Grant ODA from Others^e</i>	1.26%	0.60%	1.14%	0.45%	0.63%	1.79%
<i>Loan ODA from Others^e</i>	7.05%	8.66%	7.90%	3.58%	0.98%	10.03%
<i>Total ODA^f</i>	10.23%	16.38%	21.56%	8.68%	5.47%	20.26%

Notes: ^a Figures refer to the shares of each sectoral ODA at the commitment level in the sectoral category of development expenditure.

^b *Other sectors* is multi-sector aid/expenditure which can not be classified to the three sectors.

^c *Programme Aid* figures refer to the share of non-sectoral aid in development expenditure.

^d Figures in the column *Total* refer to the shares of each form of ODA in development expenditure.

^e Figures refer to all bilateral and multilateral ODA from other donors, excluding Japan.

^f Figures in some columns may not add up to Total ODA due to rounding error.

Calculated from OECD (1996b), ADB (1995), IMF (1982), and IMF (1996).

Table 4.2 Composition of Sectoral Aid: 1987-1994^a

	<i>Social Services</i>	<i>Economic Services</i>	<i>Production</i>	<i>Other Sectors^b</i>	<i>Programme Aid^c</i>	<i>Total of Development Expenditure^d</i>
<i>Grant ODA from Japan</i>	0.91%	0.13%	2.73%	0.69%	0.02%	0.85%
<i>Loan ODA from Japan</i>	3.74%	14.84%	8.44%	15.41%	5.46%	14.79%
<i>Grant ODA from Others^e</i>	3.56%	2.61%	3.34%	5.54%	0.16%	3.17%
<i>Loan ODA from Others^e</i>	2.68%	9.87%	6.42%	4.59%	0.33%	6.45%
<i>Total ODA^f</i>	10.89%	27.46%	20.93%	26.23%	5.97%	25.26%

Notes: ^a Figures refer to the shares of each sectoral ODA at the commitment level in the sectoral category of development expenditure.

^b *Other sectors* is multi-sector aid/expenditure which can not be classified to the three sectors.

^c *Programme Aid* figures refer to the share of non-sectoral aid in development expenditure.

^d Figures in the column *Total* refer to the shares of each form of ODA in development expenditure.

^e Figures refer to all bilateral and multilateral ODA from other donors, excluding Japan.

^f Figures in some columns may not add up to Total ODA due to rounding error.

Calculated from OECD (1996b), ADB (1995), IMF (1982), and IMF (1996).

Tables 4.1 and 4.2 also show a strong concentration of loan aid in the economic services and production sectors in Indonesia. It also presents the relative importance of Japan's loan ODA in all the sectors except for the social services sector throughout the 1973-1994 period. Despite its small contribution to the social services sector, Japan's ODA has been one of the major aid programmes in Indonesia since its inception in 1967. Japan has been the largest donor of bilateral ODA to Indonesia since 1974, and became the largest donor exceeding the World Bank in 1988 (Overseas Economic Cooperation Fund (OECF), 1993). There is a strong concentration of Japan's loan ODA in the economic services and production sectors, as shown in Tables 4.1 and 4.2. The marked increase in Japan's loan ODA to other sectors for the period 1986-1994 reflects Japan's focus on environment projects and general poverty alleviation programme, both of which are regarded as multi-sector aid allocation (Gaimusho, 1995a). This is in line with the OECD's shift in aid focus in the mid 1980s and early 1990s. See OECD (1986, 1990) and World Bank (1990, 1992).

The last of the three fiscal policies, i.e. improvement of income distribution, is concerned with equity implications. The government's intention is reflected in the gradual increases in the development budget allocated for agriculture and rural development in *REPELITA I* (1969/70-1973/74) and *REPELITA II* (1973/74-1978/79). A substantial part of the development budget has been financed by foreign aid. Social services expenditure rose sharply during the *REPELITA*'s I and II, compared to other sectors. Between 1973/74 and 1978/79, social services expenditure (per capita) rose by 157 per cent in real term, while economic services and production expenditures increased by 113 per cent and 58 per cent, respectively.⁴ By the end of *REPELITA III* (1978/79-1983/84), tangible improvements were noticeable in the social indicators, resulting in a smaller proportion of the population living below the poverty line, lower infant mortality rate, increased literacy rate, etc. (Ministry of Foreign Affairs (MFA), 1996). As the economy reached the stage of "take-off" to follow Rostow's five stages of development (Rostow, 1950) in the recent years, there has been a shift in the national development priorities from planning specific sectors of the economy to the planning of social development in its broadest sense (BAPPENAS, 1996). This policy is associated with a shift from project aid to sectoral

⁴ Calculated from ADB (1995).

programme aid, particularly of Japan's ODA in recent years (Gaimusho, 1995a). However, despite the tax reforms of 1984-85, the tax regime remains only mildly progressive in Indonesia (Hill, 1996).

It should also be noted that the allocation of foreign aid had been coordinated by the Inter-Governmental Group for Indonesia (IGGI) which came to existence in 1966. The IGGI is a consortium of aid donors to Indonesia. The IGGI has been replaced by the Consultative Group for Indonesia (CGI) since 1992, which is now represented by 18 major bilateral donors and 14 multilateral development agencies.⁵ The IGGI/CGI forum has played an important role in coordinating various donors' (bilateral and multilateral) interests in the allocation of foreign aid with the Indonesia's government development policy.

It is still debatable as to whether the three fundamental goals have been achieved in a strict sense. As a result of the "disguised" balanced budget rule, the Indonesian government has persistently run budget deficits which led to foreign debt problems in the late 1980s. This suggests the importance of foreign aid as a source of revenue, and it is unlikely that foreign aid has been considered a complementary source of development financing, despite the intention to reduce foreign aid dependence. Moreover, the level of welfare of the nation has been raised through increased government expenditure in all the social, economic and production sectors, which are also financed by foreign aid.

4.3 Aid Fungibility: The Theoretical Framework

Many studies have used a structural model to examine the impact of aid on fiscal behaviour (Heller, 1975; Mosley *et al.*, 1987, Gang and Khan, 1990, Kumssa and Khan, 1995). Although some of these studies employ simultaneous estimation of aid

⁵ The 18 bilateral donors and 14 multilateral development agencies, respectively, are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, New Zealand, Norway, Republic of Korea, Spain, Sweden, Switzerland, United Kingdom, the United States, the Asian Development Bank, World Bank, European Union, United Nations Development Programme (UNDP), International Fund for Agricultural Development (IFAD), United Nations Children's Fund (UNICEF), World Food Programme (WFP), United Nations Population Fund (UNFPA), World Health Organisation (WHO), Islamic Development Bank, Nordic Investment Bank, European Investment Bank, Saudi Fund and Kuwait Fund (MFA, 1996).

impact, it suffers from several disadvantages (Cashel-Cordo and Craig, 1990). On the other hand, the analysis of aid fungibility recently undertaken by Pack and Pack (1990), is more general. Although the model has originated from a median voter model (Bergstrom and Goodman, 1973; Borchering and Deacon, 1972), which is not relevant in the case of Indonesia, it accurately captures the essence of the bureaucratic decision-making process (Pack and Pack, 1990, p. 189).⁶ Thus, this study employs a similar aid fungibility model used in Pack and Pack (1990). Moreover, some element of the model developed by Cashel-Cordo and Craig (1990) is adopted here, in that, the model differentiates the impact of Japan's categorical (sectoral) aid from other donors' aid and non-sectoral aid.⁷ Pack and Pack (1990), excluded programme aid in their model.

Essentially, three main equations to be analysed in this study are specified as representing non-development current expenditure (*CE*), development expenditure (*DE*), and domestic revenue (*RE*), which take the following forms:

Non-Development Current Expenditure

$$CE_t = f(JT_{t-i}, FT_{t-i}, NS_{t-i}, GDP_{t-i}), \quad (4.1)$$

where CE_t is non-development current expenditure in period t ,
 t is the period 1973-1994,
 JT_{t-i} is total sectoral aid from Japan, lagged i period,
 FT_{t-i} is total sectoral aid from all donors, excluding Japan,
 NS_{t-i} is non-sectoral aid from all donors, including Japan, and
 GDP_{t-i} is Gross Domestic Product.

Development Expenditure

A general equation for development expenditure is specified as follows:

$$DE_{j,t} = g_j(JT_{j,t-i}, FT_{j,t-i}, OT_{j,t-i}, NS_{t-i}, GDP_{t-i}), \quad (4.2)$$

where $DE_{j,t}$ is development expenditure in sector j in period t ,
 $j = 1, \dots, 4$, where 1 = social services, 2 = economic services,
 3 = production, and 4 = other sectors,
 $JT_{j,t-i}$ is Japan's aid to sector j , lagged i period,
 $FT_{j,t-i}$ is aid to sector j from all donors, excluding Japan, and

⁶ While the decision on the aid allocation is largely determined by the CGI (or formerly IGGI), the fiscal budgetary decision is made by the Ministry of Finance, under the Directorate General of Budget, which has to cooperate with the Ministry of National Planning Development (BPS, 1996a).

⁷ Non-sectoral aid consists of food aid, debt relief, and other general programme aid.

$OT_{j, t-i}$ is all sectoral aid to sectors other than j , i.e. total sectoral aid minus $(JT_{j, t-i} + FT_{j, t-i})$,

Focusing on the sectoral allocation of aid in the development expenditure category ($DE_{j, t}$) in equation 4.2, the four sectors that will be analysed are as follows: social services sector (SX_t) (health, education, etc.), economic services sector (EX_t) (transport, energy, etc.), production sector (PX_t) (agriculture, manufacturing, etc.), and other sectors (OX_t) (unspecified projects/expenditures). This sectoral division is expected to capture the differences in Japan's aid allocation to various sectors, which also reflects aid being concentrated in the economic services and production sectors, and a small proportion allocated to the social services sector.⁸ Specifically, the models to be estimated, based on four sectors, for the development expenditure equation (4.2) are as follows:

$$SX_t = g_1(JS_{t-i}, FS_{t-i}, OS_{t-i}, NS_{t-i}, GDP_{t-i}), \quad (4.2.1)$$

where SX_t is development expenditure to the social services sector in period t ,
 t is the period 1973-1994,

JS_{t-i} is Japan's aid to the social services sector, lagged i period,

FS_{t-i} is total aid from all donors, excluding Japan, to the social services sector, and

OS_{t-i} is total aid from all donors, including Japan, to the non-social services sectors.

$$EX_t = g_2(JE_{t-i}, FE_{t-i}, OE_{t-i}, NS_{t-i}, GDP_{t-i}), \quad (4.2.2)$$

where EX_t is development expenditure to the economic services sector in period t ,

JE_{t-i} is Japan's aid to the economic services sector, lagged i period,

FE_{t-i} is total aid from all donors, excluding Japan, to the economic services sector, and

OE_{t-i} is total aid from all donors, including Japan, to the non-economic services sectors.

$$PX_t = g_3(JP_{t-i}, FP_{t-i}, OP_{t-i}, NS_{t-i}, GDP_{t-i}), \quad (4.2.3)$$

where PX_t is development expenditure to the production sector in period t ,

JP_{t-i} is Japan's aid to the production sector, lagged i period,

FP_{t-i} is total aid, excluding Japan, to the production sector, and

OP_{t-i} is total aid, including Japan, to the non-production sectors.

⁸ See Section 4.2, Tables 4.1 and 4.2.

$$OX_t = g_4(JO_{t-i}, FO_{t-i}, OO_{t-i}, NS_{t-i}, GDP_{t-i}), \quad (4.2.4)$$

where OX_t is development expenditure to the other sectors in period t ,
 JO_{t-i} is Japan's aid to the other sectors, lagged i period,
 FO_{t-i} is total aid from all donors, excluding Japan, to the other sectors, and
 OO_{t-i} is total aid from all donors, including Japan, to the non-other sectors.

Domestic Revenue

$$RE_t = h(JT_{t-i}, FT_{t-i}, NS_{t-i}, GDP_{t-i}), \quad (4.3)$$

where RE_t is domestic revenue in period t .

Non-development expenditure equation, i.e. equation (4.1), is estimated to test for aggregate fungibility, in that, it tests whether aid finances non-development purposes by substituting other funds. If the sign is positive for the independent variables (JT , FT , and NS), this means that aid leaks into non-development current expenditure, supporting the case of aggregate aid fungibility. A negative coefficient on these aid variables (JT , FT , and NS), on the other hand, could suggest that aid reduces non-development current expenditure.

The development expenditure equations for each sector (SX , EX , PX , and OX), i.e. equations (4.2.1), (4.2.2), (4.2.3) and (4.2.4), respectively, are estimated to measure the impact of sectoral fungibility. In addition to sectoral aid to sector j from Japan, (JT_j), and all other donors, (FT_j), all sectoral aid other than the aid intended for the sector j , (OT_j), is incorporated to capture the effect of aid inflow to sectors other than sector j .

The models assume that if the expected sign for the coefficients for JT_j and FT_j in equation (4.2) is positive, this could indicate that sectoral aid is associated with an increase in development expenditure in sector j , rejecting the case of sectoral aid fungibility. On the other hand, if a negative, or even statistically insignificant positive, coefficient is obtained for the two variables, (JT_j and FT_j), this could suggest that an increase in aid is associated with a reduction in, or no significant impact on, development expenditure for that particular sector, implying the case of aid fungibility at the sectoral level. A positive coefficient for OT_j could imply that aid allocated to other sectors is effective in raising development expenditure for that particular sector.

Domestic revenue equation, i.e. equation (4.3), is estimated to test for aggregate fungibility. It tests whether aid substitutes domestic revenue. Since tax revenue comprises mostly of the domestic revenue in Indonesia, this variable is used as a proxy to measure "tax efforts".⁹ If a positive coefficient is obtained for aid variables (*JT*, *FT*, and *NS*), this could explain that aid reduces tax efforts, while a negative coefficient for these aid variables could imply that aid induces tax efforts. Moreover, GDP is incorporated in all equations to determine the size of both government expenditure and revenue.¹⁰

It should be noted that equations (4.1), (4.2) and (4.3), as well as equations (4.2.1), (4.2.2), (4.2.3) and (4.2.4) are subject to the budget constraint as shown below as equation (4.4).

Budget Constraint

$$CE + DE = RE + JT + FT + SN, \quad (4.4)$$

where

$$JT = \sum JT_j = JS + JE + JP + JO$$

$$FT = \sum FT_j = FS + FE + FP + FO$$

$$DE = SX + EX + PX + OX$$

Equation (4.4), is important as it illustrates the nature of aid fungibility. An increase in aid from one donor and/or all donors (*JT*, *FT*, and/or *NS*) requires a matching increase in the expenditure(s) (*CE* and/or *DE*), and/or a matching decrease in domestic revenue (*RE*), and *vice versa* for a decrease in aid. In particular, if aid is non-fungible, only development expenditure (*DE*) increases/decreases when aid increases/decreases. However, if aid is fungible, an increase/decrease in aid has an impact on non-development expenditure (*CE*) and/or domestic revenue (*RE*).

⁹ On average, 93.1 per cent of domestic revenue was financed by tax between 1973 and 1994 (ADB, 1995).

¹⁰ It would be desirable to incorporate GDP by separating GDP accrued to oil and gas production from non-oil and gas GDP in the revenue equation, as undertaken by Pack and Pack (1990), because tax rates are different for oil and gas production. However, this was not possible since such data was not available when the analysis was conducted.

Since all equations are estimated over time using time-series data for the period 1973 to 1994, equation (4.4) suggests that all equations, i.e. equations (4.1), (4.2) and (4.3), as well as equations (4.2.1), (4.2.2), (4.2.3) and (4.2.4), are not independent from each other, and hence, error terms of estimated equations may be correlated with each other. Thus, a consequence of estimating each equation separately by Ordinary Least Square (OLS) may result in producing consistent but not efficient estimators (Kmenta, 1986). Therefore, if the correlation of estimated error terms of each equation are found to be significant, it may be desirable to estimate the model by seemingly unrelated regression (SUR) procedure, i.e. two-stage Aitken generalised least square (Aitken, 1934; Zellner, 1962). Moreover, various recently developed tests and estimation procedures on time-series analysis will be incorporated in this study.¹¹ It is important to discuss the estimation procedure since the early econometric estimation of the fiscal behaviour models can be criticised for the methods employed. Recent econometric literature emphasises the importance of spurious regression which results from lack of correct tests and methodology for time-series analysis.

4.3.1 Estimation Procedure

Since the analysis is based on time-series data, it is important to test for the stationarity of the variables in the estimated equations. Ignoring the stationarity properties may consequently result in spurious regression (Charemza and Deadman, 1992). The Dickey-Fuller (DF) and Augmented Dickey-Fuller (ADF) unit-root tests are used to determine the order of integration of the variables (Dickey and Fuller, 1979; MacKinnon, 1991). According to the unit-root tests, if the variables do not reject the hypothesis of non-stationarity in the level form, then, this suggests the need for an appropriate differencing of variables until they are stationary. This procedure is adopted in this study and the results are reported in Chapter 5.

Once the order of integration is determined, the Johansen maximum likelihood cointegration procedure is employed to test for the long-run relationship between aid and fiscal behaviour (Johansen, 1991). According to the Granger representation theorem, since the variables are in the same order of integration, the above-mentioned

¹¹ See Gujarati (1995), Johansen (1991), and Rao (1994).

variables may be cointegrated and hence represent a valid error-correction mechanism (ECM) (Engle and Granger, 1987; Holden and Perman, 1994). Hence, the application of Johansen maximum likelihood cointegration technique is an important step before examining the short-run dynamic relationship between aid and fiscal behaviour.

An ECM is adopted in the estimation of the equations to examine the short-run impact of aid on fiscal behaviour. It should be noted that it is this short-run relationship between aid and fiscal behaviour that relates to aid fungibility. Some light is thrown on the expected signs of the short-run coefficient for aid variables.

Equations with the ECM for non-development current expenditure, development expenditure and domestic revenue are show below.

$$\Delta CE_t = f(\Delta JT_{t-1}, \Delta FT_{t-1}, \Delta NS_{t-1}, \Delta CE_{t-1}, \Delta GDP_{t-1}, ECM_{t-1}), \quad (4.5)$$

where t denotes year, 1973 to 1994,
 Δ stands for the first differenced form,
 ECM is the error term of estimated cointegrating vector, and
other notations follow those in equation (4.1).

$$\Delta DE_{j,t} = g_j(\Delta JT_{j,t-1}, \Delta FT_{j,t-1}, \Delta OT_{j,t-1}, \Delta NS_{t-1}, \Delta DE_{j,t-1}, \Delta GDP_{t-1}, ECM_{j,t-1}), \quad (4.6)$$

where Δ stands for the first differenced form,
 ECM is the error term of estimated cointegrating vector, and
other notations follow those in equation (4.2).

$$\Delta RE_t = h(\Delta JT_{t-1}, \Delta FT_{t-1}, \Delta NS_{t-1}, \Delta RE_{t-1}, \Delta GDP_{t-1}, ECM_{t-1}), \quad (4.7)$$

where Δ stands for the first differenced form,
 ECM is the error term of estimated cointegrating vector, and
other notations follow those in equation (4.3).

The explanation provided above for the expected signs for each equation, i.e. equation (4.1) to (4.3) are similar to those shown above, i.e. (4.5) to (4.7). Independent variables are lagged because aid variables are obtained at the commitment level. Moreover, the length of lag of more than one period shows no significance, and hence, all the variables are lagged for one period. Also, one period lagged dependent variable is incorporated in each equation.

The models that will be estimated in this study differ from the one used in Pack and Pack (1990) in three main aspects. First, while Pack and Pack (1990) does not distinguish the sources and forms of aid, in this study, the model captures the impact of Japan's categorical aid, separating it from aid provided by other donors and programme aid. Second, it distinguishes the long-run relationship between, aid and fiscal behaviour, and the short-run impact of aid on fiscal behaviour. Finally, by taking into account the stationarity properties of the variables employed, the estimated model is free from spurious regression problem, and hence, a more appropriate econometric estimation procedure.

4.3.2 Data and Some Implications

It is important to discuss the data employed in this study. The empirical analysis is directed to Indonesia's fiscal behaviour and the aid programme, with particular emphasis on sectoral ODA from Japan and other aid donors, and non-sectoral aid from all donors.

This study employs annual data for the period 1973-1994. This is the longest period available, also taking into account the aid fungibility effect of Indonesia in the "New Order" regime. All the variables are converted in Indonesian rupiah per capita, constant 1990 prices, using price and exchange rate indices and a population series, all of which are obtained from *International Financial Statistics Yearbook (IFS)* (IMF, 1996).

Due to the lack of continuity of series data sets over time for government expenditure, this study uses two sources, i.e. IMF (1982) for the period 1973 to 1976, and ADB (1995) for the period 1977 to 1994. Although there are small discrepancies between the two data sources, there are no substantial differences so as not to influence the results.

Indonesia's fiscal data for government expenditure consist of three series: non-development current expenditure, development expenditure, and domestic revenue. Non-development current expenditure, often referred to as "routine expenditure" in the Indonesian budget, encompasses mainly of regular operating expenses, much of which consist of civil service salaries and (from the 1980s) debt service repayment

(Hill, 1996). However, it should be noted that the notional distinction between development and non-development expenditures is not effective in practice (Hill, 1996).

Development expenditures are the amount allocated for capital works, and divided into various sectors according to its purposes. For further details of these sectors and purposes, see IMF (1996) and ADB (1995). Development expenditure is generally used to pay income supplements to civil servants. Salaries paid to civil servants involved in the development projects are also included in development expenditure category.

Domestic revenue consists of tax revenue and non-tax revenue.¹² Although one may argue that using tax revenue by separating it from non-tax revenue would be more appropriate for the analysis, it should be noted that the amount of non-tax revenue is small relative to tax revenue in Indonesia. The average share of non-tax revenue in domestic revenue for 1973-1994 is estimated to be 6.25 per cent (calculated from ADB (1995) and IMF (1982)).

Aid data is obtained from the *Creditor Reporting System (CRS)*, i.e. a database of the Organisation for Economic Cooperation and Development (OECD), through personal communication (OECD, 1996b). Essentially, ODA data employed in this study is at the commitment level. Generally, many studies of aid and fiscal behaviour use disbursement data (Pack and Pack, 1990 and 1993; Feyzioglu *et al.*, 1995; Heller, 1975; Gang and Khan, 1990). However, due to lack of the availability of disbursement data for Indonesia, commitment data is used. The commitment level data is useful in explaining the magnitude and trends in aid flows, however, they do not accurately measure the actual aid received. This is due to various reasons, such as lags involved in the administration and implementation of aid projects and programmes.¹³ Furthermore, the *CRS* does not require the donors to report ODA in the technical assistance form, which is usually classified as grants. This suggests that the data coverage for Japan's grant ODA is understated, since the amount of Japan's technical

¹² Non-tax revenue includes revenue from land purchases and penalty fines.

¹³ See van de Laar (1980) for a discussion of discrepancy between commitment and disbursement in the World Bank aid projects/programmes.

cooperation in Indonesia is substantial.¹⁴ Moreover, Feyzioglu *et al.* (1995) argue that aid data at the commitment level is more prone to simultaneous bias in the analysis of fungibility, as opposed to disbursement level data.

Despite some of these shortfalls, the commitment level aid data are employed for the analysis, as mentioned earlier.¹⁵ Since the commitment data employed has been transformed into logs, it is able to capture the magnitude and trends in aid flows. Cashel-Cordo and Craig (1990) also employs data at the commitment level to analyse the relationship between aid and fiscal behaviour in their cross-country study. In the case of Indonesia, there is a high level of correlation between commitment and disbursement aid at an aggregate level from Japan and all other donors, suggesting that it is a reasonable assumption to use commitment data as a proxy for aid variables in the analysis.¹⁶ Moreover, the commitment level data is useful in examining how donors' intentions are reflected in the budgetary allocation of the recipient government (Edelman and Chenery, 1977). Because commitment of aid is expected to influence the budgetary allocation, it may also be useful to use commitment level data to examine the impact of the nominated amount of aid on fiscal behaviour.

Another issue regarding aid data is that this study did not distinguish between grant aid and loan aid, although such a distinction may be desirable. Distinguishing the form of aid between grant and loan may produce a more clear scope for aid fungibility analysis, since it has been shown that grant and loan aid have different impacts on fiscal behaviour (Heller, 1975; gang and Khan, 1990). However, taking into account the difference between grant and loan aid means using many variables as independent variables, and hence, undermines the statistical significance of the models, given the short length of the time-series data (1973 to 1994).

¹⁴ According to Japan International Cooperation Agency (JICA), the cumulated amount of technical cooperation ODA to Indonesia between 1967 and 1994 reached 16 billion yen at the disbursement level (Gaimusho, 1995a).

¹⁵ Several contacts have been made to Ministry of National Development Planning, Indonesia, and Indonesian Central Bureau of Statistics, both of which may have access to disbursement aid data by sectors, however, lack of response from these agencies led to unavailability of disbursement data.

¹⁶ Correlation between aid at commitment and disbursement levels for period 1973-1994 is 88.0 and 75.3 per cent for Japan's aid and all other aid, respectively. See Appendix A (Table A.1) for the correlation matrix of the variables.

There is a need to match the sectors of two different data sources appropriately, since government expenditures and foreign aid are obtained from different data sources. Four sectors, i.e. social services, economic services, production, and other sectors, are chosen to be the most appropriate sectoral representation for the analysis and are matched, as shown in Table 4.3. See OECD (1996c) and IMF (1996) for more precise definitions of these sectors.

It should also be noted that there is a substantial amount of “off-budget” funds in Indonesia. For example, Pertamina, one of the well-known state oil companies, is financed as off-budget expenditure (Hill, 1996). Hill (1996) also points out that although the government budget allows for defence expenditure, there is also a considerable amount of defence expenditure known to appear in the “off-budget”.¹⁷

Some caution will be excused when the results are interpreted in the following chapter, given the limitations and availability of data employed for the analysis of aid fungibility for Indonesia.

Table 4.3 Sectoral Classifications of Development Expenditure and ODA

Government Sectoral Expenditures: ADB Definitions		Sectoral Aid by: CRS Definitions	
General public services	O	Education	S
Defence	O	Health and population	S
Education	S	Government and civil services	O
Health	S	Water supply and sanitation	S
Social security and welfare	S	Other social infrastructure/services	S
Housing and community amenities	S	Transport and communications	E
Agriculture	P	Energy	E
Industry	P	Other economic services	E
Electricity, gas and water	E	Agriculture	P
Transport and communications	E	Industry, mining and construction	P
Other economic services	E	Trade, banking and tourism	P
Others	O	Other production	P
		Multi-sector	O

Note: Alphabets S, E, P, and O, denote for social services, economic services, production, and other sectors, respectively.

Sources: ADB (1995), OECD (1996b).

¹⁷ Off-budget expenses are financed by the large government banking sector (Hill, 1996).

4.4 Summary and Conclusion

This chapter presents the theoretical model, data and some implications of the aid fungibility models that will be analysed for Indonesia.

The model focuses on Japan's ODA, which comprises more than half of total ODA received by Indonesia, and hence, one of the most important sources of foreign aid. The model also incorporates aid from other donors and non-sectoral aid, which may have an impact on Indonesia's fiscal behaviour. Equations for non-development expenditure and domestic revenue are derived to examine aid fungibility at an aggregate level. Moreover, since aid fungibility may also occur between various sectors of the economy, sectoral aid fungibility is examined by dividing development expenditure into social services, economic services, production, and other sectors.

Since the analysis involves time-series data, an appropriate estimation procedure is important to employ in order to overcome the problems of spurious regression. The estimation of the aid fungibility model is based on cointegration techniques, which may distinguish the long-run and short-run relationship between aid and fiscal behaviour. The next chapter reports the results for the models discussed here.

Chapter 5

ANALYSIS OF AID FUNGIBILITY: EMPIRICAL RESULTS

What matters ... is the pattern of the overall policy of the recipient government, not the productivity or even the wider usefulness of specific projects financed by aid, as such finance normally sets free domestic resources which can be used for other purposes (Bauer, 1971, p. 134).

5.1 Introduction

This chapter presents the empirical results of aid fungibility, focusing on Japan's bilateral Official Development Assistance (ODA) to Indonesia for the period 1973 to 1994. Since the analysis relies on time-series data, cointegration and error correction mechanism (ECM) econometric techniques are used after various tests on time-series data are implemented.

The data for Indonesia at a disaggregate level leads to some interesting conclusion by addressing specific questions. First, it examines the impact of the total sectoral aid from Japan and all other donors on non-development current government expenditure. Second, the effect of aid on development expenditure at a sectoral level is analysed. Third, the effect of aid on revenue is determined. These questions may be able to indicate the presence of aid fungibility both at aggregate and sectoral levels.

The structure of the chapter is as follows. Section 5.2 presents the fungibility models employed for this study. Section 5.3 provides the empirical results in various parts. First, Section 5.3.1 presents the results of the Dickey-Fuller (DF) and Augmented Dickey-Fuller (ADF) unit-root tests for time-series data to determine the stationarity of the variables. Second, Section 5.3.2 provides the empirical results of Johansen maximum likelihood cointegration procedure which identifies the long-run relationship between aid and fiscal behaviour. Section 5.3.3 estimates an error correction model that confirms the results derived in the Johansen procedure, and the results on the short-run impact of aid on fiscal behaviour. The final section is a conclusion. In general, the results indicate that long-run relationships exist between aid and fiscal behaviour in Indonesia. The results also show that generally aid has a significant impact on development expenditures in the short-run.

5.2 Aid Fungibility Models

As discussed in Chapter 4, three main equations are employed for the analysis of aid fungibility. For the Johansen maximum likelihood cointegration procedure, which is employed to estimate the long-run relationship between aid and fiscal behaviour, the estimated equations are specified as representing non-development current expenditure (CE), development expenditure (DE), and domestic revenue (RE), which take the following forms :

Non-Development Current Expenditure

$$CE_t = f(JT_t, FT_t, NS_t, GDP_t), \quad (5.1J)$$

where CE_t is non-development current expenditure in period t ,
 t is the period 1973-1994,
 JT_t is total sectoral aid from Japan,
 FT_t is total sectoral aid from all donors, excluding Japan,
 NS_t is non-sectoral aid from all donors, including Japan, and
 GDP_t is Gross Domestic Product.

Development Expenditure

A general equation for development expenditure is specified as follows:

$$DE_{j,t} = g_j(JT_{j,t}, FT_{j,t}, OT_{j,t}, NS_t, GDP_t), \quad (5.2J)$$

where $DE_{j,t}$ is development expenditure in sector j , in period t ,
 $j = 1, \dots, 4$, where 1 = social services, 2 = economic services,
 3 = production, and 4 = other sectors,
 $JT_{j,t}$ is Japan's aid to sector j ,
 $FT_{j,t}$ is aid to sector j from all donors, excluding Japan, and
 $OT_{j,t}$ is all other sectoral aid to sectors other than j , i.e. total sectoral aid minus $(JT_{j,t} + FT_{j,t})$.

Specifically, the models to be estimated based on four sectors of the development expenditure equation (4.2) are as follows:

$$SX_t = g_1(JS_t, FS_t, OS_t, NS_t, GDP_t), \quad (5.2.1J)$$

where SX_t is development expenditure to the social services sector, in period t ,
 t is the period 1973-1994,
 JS_t is Japan's aid to the social services sector,
 FS_t is total aid from all donors, excluding Japan, to the social services sector, and

OS_t is total aid from all donors, including Japan, to the non-social services sectors.

$$EX_t = g_2(JE_t, FE_t, OE_t, NS_t, GDP_t), \quad (5.2.2J)$$

where EX_t is development expenditure to the economic services sector,

JE_t is Japan's aid to the economic services sector,

FE_t is total aid from all donors, excluding Japan, to the economic services sector, and

OE_t is total aid from all donors, including Japan, to the non-economic services sectors.

$$PX_t = g_3(JP_t, FP_t, OP_t, NS_t, GDP_t), \quad (5.2.3J)$$

where PX_t is development expenditure to the production sector,

JP_t is Japan's aid to the production sector,

FP_t is total aid, excluding Japan, to the production sector, and

OP_t is total aid, including Japan, to the non-production sectors.

$$OX_t = g_4(JO_t, FO_t, OO_t, NS_t, GDP_t), \quad (5.2.4J)$$

where OX_t is development expenditure to the other sectors,

JO_t is Japan's aid to the other sectors,

FO_t is total aid from all donors, excluding Japan, to the other sectors, and

OO_t is total aid from all donors, including Japan, to the non-other sectors.

Domestic Revenue

$$RE_t = h(JT_t, FT_t, NS_t, GDP_t), \quad (5.3J)$$

where RE_t is domestic revenue in year t .

For the error correction models, which estimate the short-run dynamic effect for various aid on fiscal behaviour, the equations are specified as the following:

Non-Development Current Expenditure

$$\Delta CE_t = f_{ecm}(\Delta JT_{t-1}, \Delta FT_{t-1}, \Delta NS_{t-1}, \Delta CE_{t-1}, \Delta GDP_{t-1}, ECM_{t-1}), \quad (5.1)$$

where t denotes year, 1973 to 1994,

Δ stands for the first differenced form,

ECM is the error term of estimated cointegrating vector, and other notations follow those in equation (5.1J).

Development Expenditure

$$\Delta DE_{j,t} = g_{ecm,j}(\Delta JT_{j,t-1}, \Delta FT_{j,t-1}, \Delta OT_{j,t-1}, \Delta NS_{t-1}, \Delta DE_{j,t-1}, \Delta GDP_{t-1}, ECM_{j,t-1}), \quad (5.2)$$

where other notations follow those in equation (5.2J).

Specifically, the models to be estimated based on four sectors of the development expenditure equation (5.2) are as follows:

$$\Delta SX_t = g_{ecm,1}(\Delta JS_{t-1}, \Delta FS_{t-1}, \Delta OS_{t-1}, \Delta NS_{t-1}, \Delta GDP_{t-1}), \quad (5.2.1)$$

where other notations follow those in equation (5.2.1J).

$$\Delta EX_t = g_{ecm,2}(\Delta JE_{t-1}, \Delta FE_{t-1}, \Delta OE_{t-1}, \Delta NS_{t-1}, \Delta GDP_{t-1}), \quad (5.2.2)$$

where other notations follow those in equation (5.2.2J).

$$\Delta PX_t = g_{ecm,3}(\Delta JP_{t-1}, \Delta FP_{t-1}, \Delta OP_{t-1}, \Delta NS_{t-1}, \Delta GDP_{t-1}), \quad (5.2.3)$$

where other notations follow those in equation (5.2.3J).

$$\Delta OX_t = g_{ecm,4}(\Delta JO_{t-1}, \Delta FO_{t-1}, \Delta OO_{t-1}, \Delta NS_{t-1}, \Delta GDP_{t-1}), \quad (5.2.4)$$

where other notations follow those in equation (5.2.4J).

Domestic Revenue

$$\Delta RE_t = h(\Delta JT_{t-1}, \Delta FT_{t-1}, \Delta NS_{t-1}, \Delta RE_{t-1}, \Delta GDP_{t-1}, ECM_{t-1}), \quad (5.3)$$

where t denotes year,

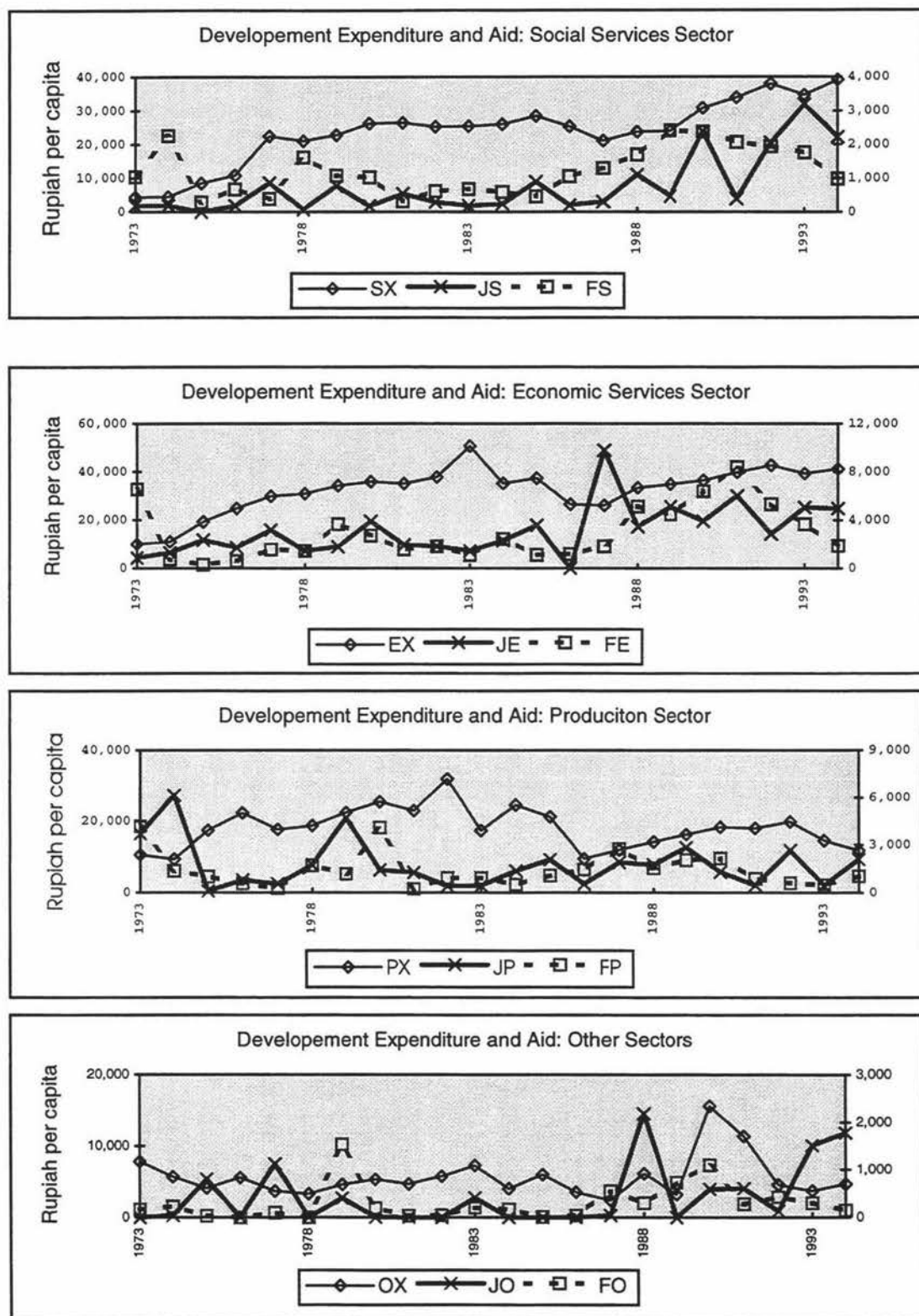
Δ stands for the first differenced form,

ECM is the error term of estimated cointegrating vector, and

other notations follow those in equation (5.3J).

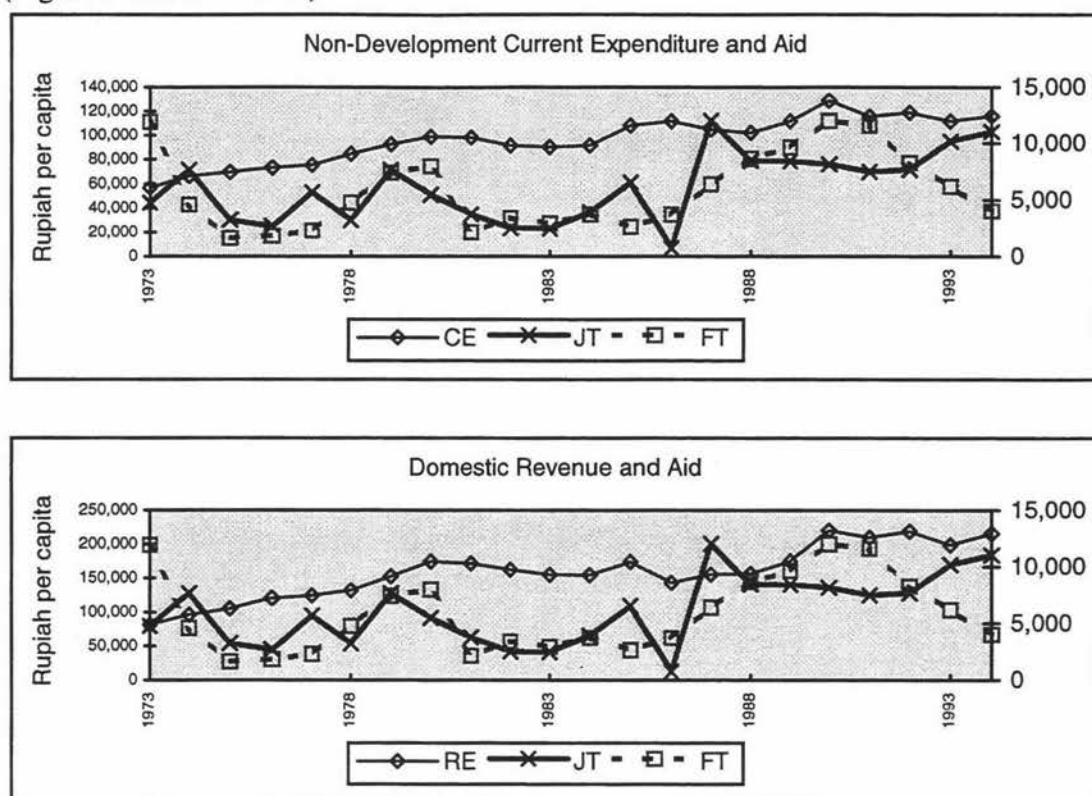
Before presenting the results for each equation, a graphical representation of trends of aid per capita and trends of expenditure per capita in each sector is shown in Figure 5.1.

Figure 5.1 Foreign Aid and Expenditure/Revenue Relationship, 1973-1994



(continues ...)

(Figure 5.1 continues ...)



Notes: All the variables are in rupiah per capita in 1990 constant prices.

All the aid variables are scaled at the right hand side of the axis, while all expenditure and revenue variables are scaled at the left hand side of the axis.

Calculated from ADB (1995), IMF (1982), OECD (1996b), and IMF (1996).

There is a general upward trend in development expenditure for the social services and economic services sector over the period examined, while aid from both Japan and all other donors does not show an increasing trend until the mid 1980s when it starts to increase rapidly. Development expenditure for the production sector seems to show neither increasing nor decreasing trend over the period examined. Aid to the production sector from Japan and all other donors also shows no clear trend over time. A similar observation can be made in the other sectors. However, at the aggregate level, total sectoral aid from Japan and other donors, non-development current expenditure and revenue show increasing trends over the period examined. Summary statistics for the data set used to estimate the aid fungibility models are presented in Appendix B, Table B2. The results of estimating each of the above equations are presented below.

5.3 Some Empirical Results

This section provides the empirical results for all the equations shown above to analyse aid fungibility hypothesis. The list of variables employed in this study is presented in Appendix B, Table B1. The results are reported in various parts below.

5.3.1 Unit-Root Tests

The first step in this empirical analysis is to test for the stationarity of all the variables employed in the estimated models. DF and ADF tests have been employed to determine the order of integration for the variables. The results of these unit-root tests with trend are derived using *Microfit 3.0* (Pesaran and Pesaran, 1991) and are given in Table 5.1.¹ Most variables indicate a problem of non-stationarity in the level form, as the ADF test does not reject the hypothesis that they are non-stationary at the 5 per cent statistical significance level. With the exception of Japan's social services aid (*IJS*) and production sectoral aid (*IJP*), the rest of the variables indicate the need for appropriate differencing of the variables to obtain stationarity. Both the DF and ADF tests reject the presence of unit-root for most of the variables in the first difference form at the 5 per cent level of significance. At the 10 per cent statistical significance level, ADF test does not reject the presence of unit-root for four variables, (*IRE*, *IEC*, *INS*, and *IGDP*), however, the variables pass the DF tests. The results, therefore, indicate that variables are integrated of order one, i.e. $I(1)$, and the analysis cautiously proceeds by applying the Johansen cointegration technique.

¹ The DF and ADF unit-root tests were also conducted without trend and with a constant term, which show similar results, but are not reported here.

Table 5.1 Dickey-Fuller (DF) and Augmented Dickey-Fuller (ADF) Unit-Root Tests: Variables of Aid Fungibility Models

Variable	Level Form		First Difference Form		Variable	Level Form		First Difference Form	
	DF	ADF	DF	ADF		DF	ADF	DF	ADF
ICE	-2.36	-2.32	-4.51 *	-3.94 *	IFT	-3.19	-3.25	-3.54 #	-3.31 #
IRE	-2.67	-2.60	-4.69 *	-2.76	IFS	-3.49 #	-2.48	-7.53 *	-3.93 *
ISX	-2.40	-3.81 *	-4.65 *	-3.32 #	IFE	-3.95 *	-2.86	-4.54 *	-4.22 *
IEX	-2.69	-2.86	-4.53 *	-2.49	IFP	-4.26 *	-2.85	-6.96 *	-3.59 #
IPX	-2.66	-3.23	-5.57 *	-4.09 *	IFO	-5.69 *	-3.25	-10.07 *	-4.27 *
IOX	-3.99 *	-3.15	-6.26 *	-4.18 *	IOS	-3.61 #	-3.32 #	-5.44 *	-3.94 *
IJT	-4.59 *	-3.07	-8.12 *	-5.37 *	IOE	-2.95	-4.18 *	-4.45 *	-3.89 *
IJS	-5.22 *	-4.69 *	-6.89 *	-12.69 *	IOP	-3.80 *	-2.62	-6.43 *	-4.29 *
IJE	-4.82 *	-3.16	-7.56 *	-4.95 *	IOO	-3.48 #	-3.55 #	-5.14 *	-3.97 *
IJP	-4.78 *	-4.55 *	-7.26 *	-4.85 *	INS	-2.24	-1.85	-4.03 *	-3.03
IJO	-4.25 *	-2.92	-6.88 *	-6.28 *	IGDP	-2.05	-2.14	-3.71 *	-2.72

Notes:

- ICE is log of non-development current expenditure *per capita*
 IRE is log of domestic revenue *per capita*
 ISX is log of development expenditure for the social services sector *per capita*
 IEX is log of development expenditure for the economic services sector *per capita*
 IPX is log of development expenditure for the production sector *per capita*
 IOX is log of development expenditure for the other sectors *per capita*
 IJT is log of total Sectoral ODA from Japan *per capita*
 IJS is log of sectoral ODA for the social services sector from *per capita* Japan
 IJE is log of sectoral ODA for the economic services sector from Japan *per capita*
 IJP is log of sectoral ODA for the production sector from Japan *per capita*
 IJO is log of sectoral ODA for the other sectors from Japan *per capita*
 IFT is log of sectoral ODA from all other donors *per capita*
 IFS is log of sectoral ODA for the social services sector from all other donors *per capita*
 IFE is log of sectoral ODA for the economic services sector from all other donors *per capita*
 IFP is log of sectoral ODA for the production sector from all other donors *per capita*
 IFO is log of sectoral ODA for the other sectors from all other donors *per capita*
 INS is log of non-sectoral ODA from all donors *per capita*
 IOS is log of sectoral ODA for non-social services sectors from all donors *per capita*
 IOE is log of sectoral ODA for non-economic services sector from all donors *per capita*
 IOP is log of sectoral ODA for non-production sector from all donors *per capita*
 IOO is log of sectoral ODA for non-other sectors from all donors *per capita*
 IGDP is log of Gross Domestic Product *per capita*

where ODA refers to official development assistance at the commitment level, and

All the units are in real rupiah in 1990 constant prices.

* denotes for statistical significance at the 5 per cent level.

denotes for statistical significance at the 10 per cent level.

Critical values: DF=-3.65, ADF=-3.66 at the 5 per cent level of significance; DF=-3.27,

ADF=-3.28 at the 10 per cent level of significance.

Both the DF and ADF tests are conducted with trend.

5.3.2 Aid and Fiscal Behaviour: Results for Johansen Maximum Likelihood Cointegration Procedure

Given that most of the variables are $I(1)$, the Johansen maximum likelihood cointegration technique is used to examine the long-run relationship between aid and fiscal behaviour. Both maximal eigenvalue and trace methods are used. The lag length of the variables in the estimation is chosen to be two, which is generally sufficient for annual data series (Holden and Thompson, 1992).²

The results indicate that, overall, there exist a long-run relationships exist between aid and fiscal behaviour. The results are presented in Tables 5.2, 5.3 and 5.4. Both maximal eigenvalue and trace procedures identify the presence of one or more-than-one long-run relationships in all equations at the 5 per cent statistical significance level.

**Table 5.2 Johansen Maximum Likelihood Procedure:
Non-Development Current Expenditure Equation (5.1J)**

(Trended case, with trend in DGP)							
Cointegration LR Test Based on Maximal Eigenvalue and Trace of the Stochastic Matrix							
20 observations from 1975 to 1994. Maximum lag in VAR = 2.							
List of variables in the cointegrating vector: ICE IJT IFT INS IGDP							
List of eigenvalues in descending order: 0.822 0.690 0.585 0.270 0.022							
Null	Alternative	<u>Maximal Eigenvalue</u>			<u>Trace</u>		
		Statistic	95% C.V.	90% C.V.	Statistic	95% C.V.	90% C.V.
$r = 0$	$r = 1$	34.54	33.46	30.90	82.26	68.52	64.84
$r \leq 1$	$r = 2$	23.43	27.07	24.73	47.73	47.21	43.95
$r \leq 2$	$r = 3$	17.57	20.97	18.60	24.30	29.68	26.79
$r \leq 3$	$r = 4$	6.29	14.07	12.07	6.73	15.41	13.33
$r \leq 4$	$r = 5$	0.44	3.76	2.69	0.44	3.76	2.69

In equation (5.1J), where the long-run relationship between aid and non-development expenditure is considered, the Johansen procedure based on maximal eigenvalue finds at least one statistically significant cointegrating vector at the 5 per cent level. Also, at least two cointegrating vector is found to be statistically significant at the 5 per cent level by the procedure based on trace. See Table 5.2.

² Although not reported, testing is also applied with Var = 1, and the results were similar to those derived with Var = 2.

Table 5.3 shows the results of various long-run relationships between sectoral aid and development expenditure in each of the four sectors specified above. In equation (5.2.1J), the maximal eigenvalue procedure identifies at least four cointegrating vectors at the 10 per cent level, while the trace procedure estimates that there are at least six long-run relationships at the 5 per cent level. The second development expenditure equation, i.e. equation (5.2.2J), estimated is for the economic services sector. According to both the maximal eigenvalue and trace procedures, there are at least three statistically significant cointegrating vectors at the 5 per cent significance level, and at least four statistically significant cointegrating vectors at the 10 per cent significance level. In equation (5.2.3J), both the maximal eigenvalue and trace procedures estimate three statistically significant cointegrating vectors at the 5 per cent level. In equation (5.2.4J), the maximal eigenvalue procedure estimates at least one cointegrating vector, while the trace procedure estimates at least three cointegrating vectors at the 5 per cent level.

**Table 5.3 Johansen Maximum Likelihood Procedure:
Development Expenditure Equations (5.2J)**

Johansen Maximum Likelihood Procedure: Social Services Sector Equation (5.2.1J)							
(Trended case, with trend in DGP)							
Cointegration LR Test Based on Maximal Eigenvalue and Trace of the Stochastic Matrix							
20 observations from 1975 to 1994. Maximum lag in VAR = 2.							
List of variables in the cointegrating vector: <i>ISX</i> <i>IJS</i> <i>IFS</i> <i>IOS</i> <i>INS</i> <i>IGDP</i>							
List of eigenvalues in descending order: 1.000 0.982 0.850 0.618 0.439 0.224							
		<u>Maximal Eigenvalue</u>			<u>Trace</u>		
Null	Alternative	Statistic	95% C.V.	90% C.V.	Statistic	95% C.V.	90% C.V.
$r = 0$	$r = 1$	172.58	39.37	36.76	326.47	94.16	89.48
$r \leq 1$	$r = 2$	80.13	33.46	30.90	153.89	68.52	64.84
$r \leq 2$	$r = 3$	37.90	27.07	24.73	73.76	47.21	43.95
$r \leq 3$	$r = 4$	19.25	20.97	18.60	35.86	29.68	26.79
$r \leq 4$	$r = 5$	11.55	14.07	12.07	16.62	15.41	13.33
$r \leq 5$	$r = 6$	5.07	3.76	2.69	5.07	3.76	2.69

(continues ...)

(Table 5.3 continues ...)

Johansen Maximum Likelihood Procedure: Economic Services Sector Equation (5.2.2J)

(Trended case, with trend in DGP)

Cointegration LR Test Based on Maximal Eigenvalue and Trace of the Stochastic Matrix

20 observations from 1975 to 1994. Maximum lag in VAR = 2.

List of variables in the cointegrating vector: *IEX* *IJE* *IFE* *IOE* *INS* *IGDP*

List of eigenvalues in descending order: 0.985 0.860 0.754 0.613 0.268 0.082

Null	Alternative	<u>Maximal Eigenvalue</u>			<u>Trace</u>		
		Statistic	95% C.V.	90% C.V.	Statistic	95% C.V.	90% C.V.
$r = 0$	$r = 1$	84.06	39.37	36.76	178.31	94.16	89.48
$r \leq 1$	$r = 2$	39.30	33.46	30.90	94.25	68.52	64.84
$r \leq 2$	$r = 3$	28.02	27.07	24.73	54.95	47.21	43.95
$r \leq 3$	$r = 4$	18.99	20.97	18.60	26.93	29.68	26.79
$r \leq 4$	$r = 5$	6.23	14.07	12.07	7.93	15.41	13.33
$r \leq 5$	$r = 6$	1.70	3.76	2.69	1.70	3.76	2.69

Johansen Maximum Likelihood Procedure: Production Sector Equation (5.2.3J)

(Trended case, with trend in DGP)

Cointegration LR Test Based on Maximal Eigenvalue and Trace of the Stochastic Matrix

20 observations from 1975 to 1994. Maximum lag in VAR = 2.

List of variables in the cointegrating vector: *IPX* *IJP* *IFP* *IOP* *INS* *IGDP*

List of eigenvalues in descending order: 0.973 0.953 0.774 0.570 0.352 0.028

Null	Alternative	<u>Maximal Eigenvalue</u>			<u>Trace</u>		
		Statistic	95% C.V.	90% C.V.	Statistic	95% C.V.	90% C.V.
$r = 0$	$r = 1$	72.23	39.37	36.76	189.24	94.16	89.48
$r \leq 1$	$r = 2$	61.20	33.46	30.90	117.01	68.52	64.84
$r \leq 2$	$r = 3$	29.71	27.07	24.73	55.81	47.21	43.95
$r \leq 3$	$r = 4$	16.88	20.97	18.60	26.11	29.68	26.79
$r \leq 4$	$r = 5$	8.67	14.07	12.07	9.23	15.41	13.33
$r \leq 5$	$r = 6$	0.57	3.76	2.69	0.57	3.76	2.69

Johansen Maximum Likelihood Procedure: Other Sector Equation (5.2.4J)

(Trended case, with trend in DGP)

Cointegration LR Test Based on Maximal Eigenvalue and Trace of the Stochastic Matrix

20 observations from 1975 to 1994. Maximum lag in VAR = 2.

List of variables in the cointegrating vector: *IOX* *IJO* *IFO* *IOO* *INS* *IGDP*

List of eigenvalues in descending order: 0.970 0.740 0.624 0.530 0.405 0.062

Null	Alternative	<u>Maximal Eigenvalue</u>			<u>Trace</u>		
		Statistic	95% C.V.	90% C.V.	Statistic	95% C.V.	90% C.V.
$r = 0$	$r = 1$	70.15	39.37	36.76	143.41	94.16	89.48
$r \leq 1$	$r = 2$	26.97	33.46	30.90	73.25	68.52	64.84
$r \leq 2$	$r = 3$	19.55	27.07	24.73	46.28	47.21	43.95
$r \leq 3$	$r = 4$	15.09	20.97	18.60	26.74	29.68	26.79
$r \leq 4$	$r = 5$	10.38	14.07	12.07	11.65	15.41	13.33
$r \leq 5$	$r = 6$	1.27	3.76	2.69	1.27	3.76	2.69

In equation (5.3J), where the long-run relationship between aid and domestic revenue is considered, both the maximal eigenvalue and trace procedures identify at least two cointegrating vectors at the 5 per cent significance level. See Table 5.4.

**Table 5.4 Johansen Maximum Likelihood Procedure:
Domestic Revenue Equation (5.3J)**

(Trended case, with trend in DGP)

Cointegration LR Test Based on Maximal Eigenvalue and Trace of the Stochastic Matrix

20 observations from 1975 to 1994. Maximum lag in VAR = 2.

List of variables in the cointegrating vector: *I*RE

*I*JT

*I*FT

*I*NS

*I*GDP

List of eigenvalues in descending order:

0.852

0.815

0.586

0.220

0.057

Null	Alternative	<i>Maximal Eigenvalue</i>			<i>Trace</i>		
		Statistic	95% C.V.	90% C.V.	Statistic	95% C.V.	90% C.V.
$r = 0$	$r = 1$	38.17	33.46	30.90	95.67	68.52	64.84
$r \leq 1$	$r = 2$	33.71	27.07	24.73	57.49	47.21	43.95
$r \leq 2$	$r = 3$	17.64	20.97	18.60	23.78	29.68	26.79
$r \leq 3$	$r = 4$	4.97	14.07	12.07	6.14	15.41	13.33
$r \leq 4$	$r = 5$	1.18	3.76	2.69	1.18	3.76	2.69

Thus, overall it could be said that at least one long-run relationship exists between aid and fiscal behaviour as indicated in the equations estimated for the non-development current expenditure, development expenditure in each of the four sectors, and the domestic revenue. The presence of long-run relationships implies that aid has a crucial impact on the Indonesia's fiscal behaviour. This suggests that it is appropriate to use the ECM models to examine the fungibility effect of aid between various sectors, as discussed in Chapter 4.

5.3.3 Aid and Fiscal Behaviour: Results for the Error Correction Models

Another way to indicate the long run relationship between aid and fiscal behaviour is to estimate the above equations using the error correction mechanism. See Gujarati (1995), and Holden and Thompson (1992) for details of this procedure. Not only is an ECM model used to confirm the existence of the long-run relationship identified in the Johansen procedure, it is also useful to identify the short-run dynamic relationship between aid and fiscal behaviour, and hence, aid fungibility.

The estimation of ECM model is conducted in line with the spirit of "general to specific" modelling, i.e. "the formulation of a fairly unrestricted dynamic model, ... , which is subsequently tested, transformed and reduced in size by performing a number of tests for restrictions" (Charemza and Deadman, 1992). Therefore, the lagged dependent variable and error correction term, which is derived from cointegrating vectors estimated by the Johansen cointegration procedure, may be taken out from the estimated models, if they do not indicate either statistical significance or the expected

sign. Ordinary Least Square (OLS) method estimates a parsimonious model using one period lagged variables in the first difference form.³ The results are presented in Table 5.5. More details of regression models are given in Appendix C.

Various model diagnostic tests, i.e. tests for serial correlation, functional form, normality of the residuals, and heteroscedasticity, indicate that the estimated models do not suffer from econometric “pathologies”. Overall the coefficient for the error correction term, (ECM_{t-1}), show a negative sign, which is consistent with the theory, and are statistically significant at 5 per cent level in all equations, except for equations (5.1) and (5.3). The statistical insignificance of ECM terms in the two equations may be due to the fact that some of the variables in the equations are not strictly $I(1)$, as shown in Table 5.1.⁴ However, the estimated coefficient for the ECM term in equation (5.3) has a correct (negative) sign, and hence, is left in the model. The results show that the estimated error correction models generally support the existence of long-run relationship between aid and fiscal behaviour, which was estimated in the Johansen cointegration procedure discussed above. Various short term impacts of aid on fiscal behaviour can be explained by examining the coefficients estimated for each equation. The results are presented in Table 5.5.

The results for equation (5.1) indicate a low R^2 , i.e. 0.09, showing a low explanatory power of the model for non-development current expenditure. Some of the coefficients estimated have the expected sign, however, none of the coefficient is statistically significant. Therefore, the results indicate that impact on non-development current expenditure is neither significant nor clear in the short-run, and hence, it could be said that there is no evidence of resource diversion to non-development current expenditure from overall development expenditure.

³ It should be noted that since the error terms of six chosen estimated equations do not show any high level of correlations, OLS is used instead of seemingly unrelated regression, SUR (Zellner, 1962). See Appendix C, Table C.7 for correlation matrix of the six error terms.

⁴ For example, the ADF test did not reject the hypothesis that domestic revenue (*IRE*) is non-stationary in the first difference form even at the 10 per cent level. See Table 5.1.

Table 5.5 Error Correction Models: The Results

Equations	5.1	5.2.1	5.2.2	5.2.3	5.2.4	5.3
Dependent Variables	ΔICE^e	ΔISX	ΔIEX	ΔIPX	ΔIOX	ΔIRE^e
Constant	0.031 (0.67)	0.222** (2.59)	5.463*** (5.42)	17.547*** (3.96)	4.316** (2.39)	2.571 (1.58)
$\Delta IJT_{j,t-1}$ ((ΔIJT_{t-1} for (5.1) & (5.3))	0.018 (0.82)	0.026*** (3.23)	0.007 (1.27)	0.179** (2.66)	-0.034** (-2.49)	-0.074 (-1.50)
$\Delta IFT_{j,t-1}$ ((ΔIFT_{t-1} for (5.1) & (5.3))	0.035 (0.90)	-0.163*** (-3.19)	0.084 (1.67)	-0.269*** (-3.81)	-0.016 (-0.62)	0.006 (0.11)
$\Delta IOT_{j,t-1}$	..	0.0488 (0.81)	0.038 (0.60)	-0.186 (-1.35)	1.087*** (3.16)	..
ΔINS_{t-1}	-0.019 (-0.59)	0.095* (1.78)	0.027 (0.38)	-0.067 (-0.62)	-0.508** (-2.34)	0.080 (1.06)
ΔGDP_{t-1}	-0.083 (-0.08)	5.078** (2.82)	4.770** (2.34)	-0.079 (-0.02)	-9.293 (-1.49)	3.389 (1.72)
(Lagged Dependent Variable) $_{t-1}$	—	—	0.952*** (4.20)	-0.338* (-1.82)	—	—
ECM_{t-1}	—	-0.434*** (-6.54)	-1.079** (-5.37)	-0.387*** (-4.00)	-0.297** (-2.25)	-0.396 (-1.58)
R^2	0.09	0.81	0.79	0.67	0.54	0.28
F-Statistic	0.35	9.19	6.53	3.52	2.64	1.08
Std. Error of Regression	0.08	0.12	0.12	0.24	0.47	0.10
Durbin Watson-Statistic	1.89	1.85	2.09	2.28	1.90	2.35
Diagnostic Tests						
Serial Correlation ^a	$\chi^2(1)$ 0.062	0.149	0.385	0.934	0.062	0.089
Functional Form ^b	$\chi^2(1)$ 0.079	3.270	3.844	3.380	0.015	0.868
Normality ^c	$\chi^2(2)$ 0.658	0.692	1.600	0.242	1.156	0.535
Heteroscedasticity ^d	$\chi^2(1)$ 1.676	0.095	0.703	0.020	5.297	0.224

Notes: Figures in parentheses are *t*-values.

* denotes significance at the 10 per cent level.

** denotes significance at the 5 per cent level.

*** denotes significance at the 1 per cent level.

^a Lagrange multiplier test of residual serial correlation.

^b Ramsey's RESET test using the square of the fitted values.

^c Jarque-Bera test of skewness and kurtosis of residuals.

^d Breusch-Pagan-Godfrey test on the regression of squared residuals on squared fitted values

^e For equations (5.1) and (5.3), ΔIJT_j is ΔIJT , i.e. the first differenced form of log of total sectoral aid from Japan, and ΔIFT_j is ΔIFT , i.e. the first differenced form of log of total sectoral aid from all donors, excluding Japan.

Critical values for the various diagnostic test at the 1 per cent significance are as follows:

$\chi(1) = 6.63$, $\chi(2) = 9.21$, $F(5,14) = 9.77$, $F(7,12) = 6.47$.

The second set of equations, i.e. equations (5.2.1) to (5.2.4), relating to aid fungibility at the sectoral level for development expenditure in the social services, economic services, production services and other sectors, provide a high degree of goodness of fit to the data. The estimated equations for various development expenditures generally show a higher explanatory power, ranging from 0.55 to 0.81, indicating the importance of the impact of aid on various government development expenditures. The expected sign of the coefficients for both the Japan' and other donors' sectoral aid

are positive for the case of non-fungibility at the sectoral level. Negative signs, on the other hand, support the case of aid fungibility. Some insights are provided by the estimates of the regression coefficients.

The results for equation (5.2.1) indicate a good fit in terms of conventional tests, i.e. R^2 and F tests. The R^2 value is 0.81 and F-statistic is statistically significant at the 1 per cent level. The coefficient estimated for Japan's sectoral aid to the social services sector, 0.026, is positive and statistically significant at the 1 per cent level. This indicates that Japan's social sector aid has a positive impact on the social services development expenditure. Put otherwise, it can be said that Japan's aid is non-fungible in the social services sector. Considering the share of Japan's social services aid in the social services development expenditure is 1.92 and 4.65 per cent for the periods 1973-1986 and 1987-1994, respectively, the value of the estimated elasticity of Japan's social services aid is most reasonable (See Tables 4.1 and 4.2). In contrast, a negative and statistically significant coefficient is estimated for social services aid from other donors. This negative coefficient implies that an increase/decrease in social services aid from other donors induces a decrease/increase in the social services expenditure, indicating a strong case for aid fungibility. A positive but statistically insignificant coefficient is estimated for non-social services aid, (ΔIOS_{t-1}), at the 10 per cent level. The non-sectoral aid, (ΔINS_{t-1}), coefficient estimated is positive and statistically significant coefficient at the 10 per cent level, indicating that some of the non-sectoral aid is used for development expenditure in the social services sector. The Δ/GDP coefficient has a high and statistically significant estimated coefficient of 5.08, indicating strong government focus in the social services sector, as economy grows.

For equation (5.2.2), i.e. development expenditure in the economic services sector, all estimate coefficients (except for the error correction term) have a positive sign. The R^2 is 0.79, indicating a good fit of the equation. Except for the constant and error term and Δ/GDP , there is no statistically significant coefficient for any of the independent aid variables, i.e. ΔIJE , ΔIFE , ΔIOE , and ΔINS . This suggests that although aid variables have a positive impact, there is no statistical evidence to conclude that each type of aid has a positive impact on the economic services expenditure or that aid is non-fungible. A positive and statistically significant coefficient for the lagged

dependent variable at the 1 per cent level is obtained indicating the importance of inertia or habit in the economic services sector. Thus, it can be said that development expenditure allocated to the economic sector depends on the last year allocation to this sector. The estimated coefficient for Δ/GDP is positive and statistically significant at the 5 per cent level, indicating that the economic services expenditure has a pro-cycle behaviour.

The production services sector equation, i.e. equation (5.2.3), also performed a good fit in terms of conventional criteria. The R^2 is 0.67 and the F-statistic is significant at the 1 per cent level. All estimated coefficients have a negative sign, except for Japan's production aid (and the constant term). Production aid from Japan has a positive and statistically significant estimated coefficient of 0.18, indicating a positive impact on the production sector expenditure. The elasticity of 18 per cent is not too large, considering the share of Japan's production aid in the production sector development expenditure is around 12 per cent (See Tables 4.1 and 4.2). This suggests non-fungibility of Japan's aid to the production sector. Production aid from other donors, on the other hand, is -0.27, and is statistically significant at the 1 per cent level. This can be interpreted that an increase/decrease in other donors' production aid does not lead to an increase/decrease in the expenditure for the production sector, suggesting the case of aid fungibility. The estimated coefficient for Δ/GDP is negative but it is not statistically significant. Also, a negative and statistically significant coefficient for the lagged dependent variable indicates an adjustment process in the production expenditure, based on the previous year allocation.

The next equation discussed is the other sectors equation (5.2.4). The R^2 value (0.54) is relatively low, compared with other development expenditure equations. However, F-statistic indicates the statistical significance of the equation at the 10 per cent level. While multi-sectoral aid project is categorised as other sectors by OECD (1996a), the other sectors reported by ADB (1995) may allocate a multi-sector project in one of the three major sectors, i.e. social services, economic services, or production sector.⁵ The other sectors aid coefficient from Japan is -0.034, and is statistically significant at the 5 per cent level, while other sectors aid coefficient from all other donors is negative

⁵ See Table 4.3 in Chapter 4 for the sectoral classifications of development expenditure and foreign aid.

but not statistically significant. Moreover, aid to non-other-sectors is estimated to have a large positive and statistically significant coefficient of 1.087 at the 5 per cent level, suggesting a substantial diversion of resources from other sectoral categories. Thus, aid appears to be fungible in this case. Non-sector aid is found to have a negative and statistically significant coefficient at the 5 per cent level. This implies that an increase/decrease in non-sectoral aid reduces/raises the expenditure for the other sectors. The Δ/GDP coefficient estimated is negative but not statistically. It can be said that the expenditure for the other sectors is considerably negatively sensitive to business cycle.

The last equation estimated relates to domestic revenue, i.e. equation (5.3). The results for equation (5.3) show that R^2 is 0.28, and F-statistic is not statistically significant. It should be noted that none of the coefficients estimated is significant. A negative coefficient is obtained for total sectoral aid from Japan but is not significant. Also, the coefficient for total sectoral aid from all other donors is positive, however, it is not statistically significant. Moreover, the non-sectoral aid coefficient is positive but not significant. A positive but statistically insignificant coefficient is also estimated for GDP. Furthermore, although an expected (negative) sign is estimated for the error correction coefficient (ECM_{t-1}), it is not statistically significant.

Overall, the results indicate a high explanatory power of the estimated equations for sectoral development expenditures. There is support for non fungibility of Japan's aid allocated to the social services and production sectors in Indonesia. On the other hand, sectoral aid from other donors to Indonesia indicates the case of aid fungibility in the social services and production sectors. Also, since the results indicate that there is a diversion of resources to the other sectors from other than the other sectors, it can be inferred that other donors' aid to the social services and production sectors may have being used for the other sectors. The presence of aid fungibility at the sectoral level but not at the aggregate level may suggest that aid projects are associated with complementary projects in other sectors of economy.

In addition to the regression analysis, this study also attempts to estimate the change in expenditures and revenue as total sectoral foreign aid changes by one rupiah per capita, using a similar simulation technique adopted in Pack and Pack (1990, 1993).

The procedure and results are presented in Appendix D. However, the results may require a cautious interpretation due to the use of commitment level data.

5.4 Conclusion

The empirical results presented in this chapter provide some important implications of aid fungibility. It can be inferred that there is at least one and more long-run relationship between aid and fiscal behaviour for all four sectors, i.e. the social services, economic services, production, and other sectors. This result also confirms the results obtained by using the error correction mechanism.

Overall, the non-development current expenditure model has a low explanatory power and none of the coefficient estimated is statistically significant. Thus, there is no support for aid fungibility in this case.

At the sectoral level, the short-run impact of aid on development expenditure produce mixed results. It is found that Japan's sectoral aid has a positive impact on the development expenditure for the social services and production sectors. Thus, there is a strong support for non-fungibility of Japan's aid to these sectors. Japan's aid to economic services sector has a positive impact on the development expenditure to the economic services sector, however, it is not statistically significant. In other words, this evidence does not support for non-fungibility of Japan's aid to the economic services sector. In contrast, other donors (excluding Japan) sectoral aid has a negative and statistically significant impact on the development expenditure for the social services and production sectors. Also, it should be noted that there is no statistical evidence that other donors' aid to the economic services and other sectors from all donors is non-fungible. Moreover, other sectors aid from other donors has a statistically significant positive impact on the development expenditure to the other sectors. Furthermore, sectoral aid allocated to other than the other sectors has a statistical significant positive impact on development expenditure in the other sectors. This suggests that other donors' sectoral aid to the social services and production sectors seems to diverge in to the other sectors. However, whether the social services and production aid from other donors' leaks into the other sectors can not determined by the models used in this study.

The impact of aid on domestic revenue does not show any statistical significance, refuting that aid is used to reduce tax efforts. This result, together with that of equation (5.1), suggests that this study finds no evidence of aid fungibility at the aggregate level.

The conclusions based on empirical results, therefore, differ slightly from those obtained by Pack and Pack (1990), who concluded that there was no evidence of aid fungibility in Indonesia. There are three possible reasons for the differences.

First, this difference may have arisen due to using different estimation technique. This empirical study used a cointegration estimation technique, based on time-series data, as opposed to SUR method, which, *a priori* assumes that variables used in the model are stationary. It has been found that aid and fiscal variables were generally non-stationary in the level form, thus a more appropriate way to analyse is the use of cointegration technique which takes account of non-stationarity of the variables. This effectively separated the short-run dynamic relationship from the long-run relationship, providing a better scope for the analysis of aid fungibility. Second, the difference may be due to different data sources, time periods used in the two studies, and the use of disbursement and commitment data. Third, while Pack and Pack (1990) employed one aid data series, this study uses other aid variables to analyse aid fungibility. The focus on the fungibility effect of Japan's bilateral ODA, as opposed to that of total ODA from all donors, required the model to separate Japan's aid from other donors' aid in this analysis. The characteristics of Japan's aid are different from other donors, and is the largest donor to Indonesia. Thus, it was important to examine Japan's aid separately from other donors. Generally, it could be said that Japan's aid in the social services and production sectors are non-fungible, while Japan's aid to the economic services and other sectors indicate the case of aid fungibility.

Chapter 6

CONCLUSION AND FURTHER RESEARCH

A hypothesis is important if it "explains" much by little (Friedman, 1953, p. 14).

6.1 Introduction

Aid fungibility, is a debatable issue, and determines the macroeconomic effectiveness of foreign aid. It has been argued that aid is misused allowed particularly in the unproductive areas or purposes which is not relevant to original purpose of aid. This study examined empirically the presence of aid fungibility focusing on Japan's foreign aid to Indonesia for the period 1973 to 1994. In particular, the main objectives were set to the analysis of the impacts of aid on various government expenditures, such as non-development current expenditure, and development expenditures in four sectors (social services, economic services, production and other sectors), as well as, domestic revenue, using a time-series econometric technique. The section below discusses the major findings of this study and suggests some further research.

6.2 Conclusion

Given the focus of this study of aid fungibility, Chapter 1 introduces briefly the main concepts of foreign aid, explaining various definitions, its origin, historical development, and its multi-dimensional objectives, such as political, commercial interests, as well as humanitarian concerns. The general concept of aid fungibility addresses resource substitutability and/or whether aid allocated to a particular sector or purpose leaks out to finance other sector(s) and/or purpose(s).

Chapter 2 addresses the issue of aid fungibility as one of many factors that impinges upon the macroeconomic effectiveness of foreign aid. The review of the literature suggests that despite various attempts undertaken by many economists, the effectiveness of foreign aid at a macro level is found to be ambiguous to date. Several reasons which obscure the macroeconomic effectiveness of foreign aid are pointed out, including: inaccurate measurement of data used in the analysis, over-aggregation issues involved in cross-country studies, rigid assumptions underlying estimated

models, backwash effects of aid on the private sector, misspecification of aid-growth relationship, and the fungibility issue of foreign aid. The review of the literature also reveals the need for further empirical evidence of aid fungibility.

Chapter 3 provides a descriptive analysis of Japan's official development assistance (ODA) in order to identify some of its characteristics and implications for aid fungibility. Despite its status as the largest aid donors in the world, Japan ranks no better than other major donors of the Organisation for Economic Cooperation and Development (OECD), when aid performance is measured by the ODA to Gross Domestic Product (GDP) ratio, and the grant element of aid. Moreover, it is shown that the economic cooperation concept and self-help approach underlying Japan's foreign aid policy have led to a concentration of Japan's ODA in the economic services and production sectors, especially as a form of concessionary loan. However, these features of Japan's foreign aid are gradually changing as a result of a shift in the aid focus toward social services and multi-sector aid, after the adoption of the 1992 ODA Charter.

Chapter 4 addresses the importance of foreign aid and especially of Japan's foreign aid to Indonesia, before introducing the fungibility models adopted in the empirical analysis in this study. The models estimate aid impact on development expenditures in the social services, economic services, production and other sectors, as well as on non-development current expenditure and domestic revenue. The models distinguish Japan's sectoral aid from other donors' sectoral aid and non-sectoral aid. This is to capture the impact of Japan's aid separately from that of other donors' aid. Moreover, since the data employed is essentially time-series, the estimation relies on the Johansen maximum likelihood cointegration procedure and error correction models.

The results of the empirical analysis are presented in Chapter 5. At least one long-run relationship is identified between foreign aid and each of expenditures at the sectoral level and domestic revenue. However, it is found that there is no significant impact on non-development current expenditure and domestic revenue. The results based on the conventional criteria of goodness of fit, such as the values of R^2 and F-statistic in the equations for non-development current expenditure and domestic revenue, suggest the

poor explanatory power of the models. In contrast, the models for development expenditure obtains high values of R^2 and F-statistic, indicating the significance of the fungibility models in explaining the changes in various development expenditures. The results suggest that the evidence is mixed. In particular, the results support for non-fungibility of Japan's aid to the social services and production sectors. However, Japan's aid does not show any statistically significant positive impact on development expenditure in the economic services and other sectors. On the other hand, it is found that aid from other donors (excluding Japan) to the social services and production sectors shows a strong case of aid fungibility. Moreover, there is no statistically significant evidence of non-fungibility for other donors' aid to the economic services and other sectors. It is also shown that aid has no statistically significant impact on domestic revenue.

In general, it can be concluded that this empirical study finds no evidence of aid fungibility at the aggregate level. There is no statistically significant evidence of the short-run impacts of aid on non-development current expenditure and domestic revenue. Therefore, it can be inferred that foreign aid from both Japan and all other donors to Indonesia is effective, to such an extent that it is used primarily for development purposes without leaking systematically into consumption and/or reducing tax efforts. This is most likely due to the presence of increasing domestic revenue, which must have enabled the Indonesian government to finance non-development current expenditure.

At the sectoral level, however, this study identifies the presence of aid fungibility. The results are mixed, indicating that the sources of aid and the sectors to which aid is allocated have some important effects in determining the presence of aid fungibility. In general, Japan's aid is less fungible, since a strong case of non-fungibility is demonstrated in the social services and production sectors. In contrast, other donors' aid is more likely to be fungible, as indicated by a negative impact of sectoral aid on development expenditure in the social services and production sectors. It could be speculated that some of the features of Japan's foreign aid, such as the large share of loan aid, the request-based system, and the self-help approach, may have contributed to prevent aid from being fungible. However, why the difference between Japan's aid

and other donors' aid exists can not be determined from the analysis in this study. Moreover, it would have been useful to identify how much of resources diverse between different sectors, as well as from which sources, however, the focus of this study has been to show that sources and sectors are important determinants of aid fungibility.

6.3 Further Research

The results obtained in this study provide some important scopes for aid fungibility, as discussed above. However, it should be noted that the results from one country can not be generalised for the case in other countries. In order to make a general statement, further evidence on aid fungibility from other developing countries is required. In particular, it would be useful to examine a developing country where the relative importance of Japan's aid is less than in Indonesia.

One of the important questions remain to be asked is "what determines the difference in the fungibility between Japan's aid and other donors' aid?". It may be important to investigate the issue of aid fungibility by focusing on different impacts between grant and loan aid, and between bilateral and multilateral aid, as well as, the implementation procedures of aid projects by different aid agencies.

Moreover, given the existence of long-run relationships that have been identified between aid and fiscal behaviour in this study, it may be important to estimate how aid is related to fiscal behaviour in the long-run. This may provide an important scope for the issue of foreign aid dependence of developing countries.

Appendix A

COMPARISON OF COMMITMENT AND DISBURSEMENT DATA

Table A.1 Estimated Correlation Matrix: Commitment and Disbursement Aid

	JTCM	JTND	FTCM	FTND
JTCM	1	0.880	0.527	0.232
JTND	0.880	1	0.477	0.232
FTCM	0.527	0.477	1	0.753
FTND	0.232	0.232	0.753	1

Notes: JTCM is Japan's total ODA at the commitment level,
 JTND is Japan's total ODA at the disbursement level,
 FTCM is total ODA from all donors at the commitment level, excluding Japan, and
 FTND is total ODA from all donors at the disbursement level, excluding Japan.
 Calculated from *CRS* (OECD, 1996) and *Geographical Distribution of Financial Flows*
 (OECD, 1979, 1981, 1984, 1988, 1990, 1995).

Appendix B

DESCRIPTION OF VARIABLES IN THE ESTIMATED MODELS

Table B.1 List of Variables in the Estimated Models

Variable	Description
CE	Non-development current expenditure <i>per capita</i>
RE	Domestic revenue <i>per capita</i>
SX	Development expenditure for social services sector <i>per capita</i>
EX	Development expenditure for economic services sector <i>per capita</i>
PX	Development expenditure for production sector <i>per capita</i>
OX	Development expenditure for other sectors <i>per capita</i>
JT	Total Sectoral ODA from Japan <i>per capita</i>
JS	Sectoral ODA for social services sector from Japan <i>per capita</i>
JE	Sectoral ODA for economic services sector from Japan <i>per capita</i>
JP	Sectoral ODA for production sector from Japan <i>per capita</i>
JO	Sectoral ODA for other sectors from Japan <i>per capita</i>
FT	Sectoral ODA from all other donors <i>per capita</i>
FS	Sectoral ODA for social services sector from all other donors <i>per capita</i>
FE	Sectoral ODA for economic services sector from all other donors <i>per capita</i>
FP	Sectoral ODA for production sector from all other donors <i>per capita</i>
FO	Sectoral ODA for other sectors from all other donors <i>per capita</i>
NS	Non-sectoral (programme) ODA from all donors <i>per capita</i>
OS	Sectoral ODA for non-social services sector from all donors <i>per capita</i>
OE	Sectoral ODA for non-economic services sector from all donors <i>per capita</i>
OP	Sectoral ODA for non-production sector from all donors <i>per capita</i>
OO	Sectoral ODA for non-other sectors from all donors <i>per capita</i>
GDP	Gross Domestic Product <i>per capita</i>

Notes: ODA refers to official development assistance at the commitment level.
All the units are in real rupiah adjusted for year 1990.

Table B.2 Statistical Description of Variables in the Estimated Models

<i>Sample period:</i>	1973 to 1994	1973 to 1994	1973 to 1994	1973 to 1994
<i>Variable(s):</i>	CE	RE	SX	EX
<i>Maximum:</i>	128704.9	219907.7	39098.5	50661.0
<i>Minimum:</i>	56613.0	81113.5	4362.2	9989.1
<i>Mean:</i>	96303.1	158849.5	23715.1	32375.4
<i>Std. Deviation:</i>	19153.8	39232.4	9563.4	9791.8

<i>Sample period:</i>	1973 to 1994	1973 to 1994	1973 to 1994	1973 to 1994
<i>Variable(s):</i>	PX	OX	JT	JS
<i>Maximum:</i>	31870.9	15592.5	12022.9	3185.8
<i>Minimum:</i>	9206.6	2368.8	734.6152	0.00
<i>Mean:</i>	18002.5	5568.0	6071.6	765.0292
<i>Std. Deviation:</i>	5697.9	2954.0	3058.5	885.5659

<i>Sample period:</i>	1973 to 1994	1973 to 1994	1973 to 1994	1973 to 1994
<i>Variable(s):</i>	JE	JP	JO	FT
<i>Maximum:</i>	9782.4	6135.0	2179.3	12004.9
<i>Minimum:</i>	0.00	96.8966	0.00	1618.7
<i>Mean:</i>	3114.0	1755.9	436.7139	5800.5
<i>Std. Deviation:</i>	2154.4	1513.6	652.3967	3412.9

<i>Sample period:</i>	1973 to 1994	1973 to 1994	1973 to 1994	1973 to 1994
<i>Variable(s):</i>	FS	FE	FP	FO
<i>Maximum:</i>	2409.4	8398.5	4168.7	1533.9
<i>Minimum:</i>	283.0901	296.3889	233.6523	0.00
<i>Mean:</i>	1206.1	2890.4	1405.6	298.4933
<i>Std. Deviation:</i>	698.7218	2246.5	1082.6	383.6072

<i>Sample period:</i>	1973 to 1994	1973 to 1994	1973 to 1994	1973 to 1994
<i>Variable(s):</i>	NS	OS	OE	OP
<i>Maximum:</i>	10782.2	16825.7	10206.9	17739.4
<i>Minimum:</i>	325.4971	3186.0	2195.7	2444.6
<i>Mean:</i>	3541.4	9901.0	5867.8	8710.7
<i>Std. Deviation:</i>	2951.6	4657.2	2900.5	4856.2

<i>Sample period:</i>	1973 to 1994	1973 to 1994
<i>Variable(s):</i>	OO	GDP
<i>Maximum:</i>	18481.3	1324653
<i>Minimum:</i>	4010.8	540516.7
<i>Mean:</i>	11136.9	874361.3
<i>Std. Deviation:</i>	5138.4	226186.6

Calculated from ADB (1995), IMF (1982), OECD (1996a), and IMF (1996).

All the variables are in per capita rupiah in 1990 constant price.

Appendix C

ERROR CORRECTION MODELS

Table C. 1 Error Correction Models: Non-Development Current Expenditure

Dependent Variable: ΔICE		Equations 5.1		
Regressor		5.1a	5.1b	5.1c
<i>Constant</i>		0.188 (1.13)	0.187 (1.24)	0.031 (0.67)
ΔIJT_{-1}		-0.028 (-0.55)	-0.027 (-0.59)	0.018 (0.82)
ΔIFT_{-1}		0.056 (1.24)	0.056 (1.30)	0.035 (0.90)
ΔINS_{-1}		-0.393E-3 (-0.01)	-0.474E-3 (-0.01)	-0.019 (-0.59)
ΔGDP_{-1}		0.122 (0.11)	0.117 (0.11)	-0.083 (-0.08)
ΔICE_{-1}		-0.007 (-0.03)	—	—
ECM_{-1}		0.061 (0.99)	0.060 (1.09)	—
R^2		0.16	0.15	0.09
F-Statistic		0.41	0.52	0.35
Std. Error of Regression		0.08	0.08	0.08
Durbin Watson-Statistic		2.00	2.01	1.89
<i>Diagnostic Tests</i>				
Serial Correlation ^a	$\chi^2(1)$	0.005	0.004	0.062
Functional Form ^b	$\chi^2(1)$	0.579	0.514	0.079
Normality ^c	$\chi^2(2)$	0.191	0.199	0.658
Heteroscedasticity ^d	$\chi^2(1)$	0.157	0.186	1.676

Notes: Figures in parentheses are *t*-values.

^a Lagrange multiplier test of residual serial correlation.

^b Ramsey's RESET test using the square of the fitted values.

^c Jarque-Bera test of skewness and kurtosis of residuals.

^d Breusch-Pagan-Godfrey test on the regression of squared residuals on squared fitted values

Critical values for the various diagnostic test at the on per cent significance are as follows:

$\chi(1) = 6.63$, $\chi(2) = 9.21$.

**Table C. 2 Error Correction Models: Social Services Sector
Development Expenditure**

Dependent Variable: ΔISX		Equations 5.2.1		
Regressor		5.2.1a	5.2.1b	5.2.1c
<i>Constant</i>		0.266*** (3.34)	0.222** (2.59)	-0.016 (-0.10)
ΔIJS_{-1}		0.028*** (3.89)	0.026*** (3.23)	0.009 (0.56)
ΔIFS_{-1}		-0.117** (-2.30)	-0.163*** (-3.19)	0.029 (0.35)
ΔIOS_{-1}		0.071 (1.29)	0.0488 (0.81)	0.178E-4 (0.15E-3)
ΔINS_{-1}		0.068 (1.36)	0.095* (1.78)	-0.029 (-0.30)
ΔGDP_{-1}		3.356* (1.85)	5.078** (2.82)	2.855 (0.81)
ΔISX_{-1}		0.312* (2.05)	—	—
<i>ECM₋₁</i>		-0.444*** (-7.44)	-0.434*** (-6.54)	—
R^2		0.86	0.81	0.18
F-Statistic		10.42	9.19	0.62
Std. Error of Regression		0.11	0.12	0.24
Durbin Watson-Statistic		2.57	1.85	1.10
Diagnostic Tests				
Serial Correlation ^a	$\chi^2(1)$	3.717	0.149	3.655
Functional Form ^b	$\chi^2(1)$	0.600E-4	3.270	10.114
Normality ^c	$\chi^2(2)$	0.360	0.692	3.144
Heteroscedasticity ^d	$\chi^2(1)$	0.265	0.095	4.427

Notes: Figures in parentheses are *t*-values.

* denotes significance at the 10 per cent level.

** denotes significance at the 5 per cent level.

*** denotes significance at the 1 per cent level.

^a Lagrange multiplier test of residual serial correlation.

^b Ramsey's RESET test using the square of the fitted values.

^c Jarque-Bera test of skewness and kurtosis of residuals.

^d Breusch-Pagan-Godfrey test on the regression of squared residuals on squared fitted values

Critical values for the various diagnostic test at the on per cent significance are as follows:

$\chi(1) = 6.63$, $\chi(2) = 9.21$.

Table C. 3 Error Correction Models: Economic Services Sector Development Expenditure

Dependent Variable: ΔIEX	Equation 5.2.2
Regressor	5.2.2a
<i>Constant</i>	5.463*** (5.42)
$\Delta IJE_{.1}$	0.007 (1.27)
$\Delta IFE_{.1}$	0.084 (1.67)
$\Delta IOE_{.1}$	0.038 (0.60)
$\Delta INS_{.1}$	0.027 (0.38)
$\Delta IGDP_{.1}$	4.770** (2.34)
$\Delta IEX_{.1}$	0.952*** (4.20)
$ECM_{.1}$	-1.079** (-5.37)
R^2	0.79
F-Statistic	6.53
Std. Error of Regression	0.12
Durbin Watson-Statistic	2.09
<i>Diagnostic Tests</i>	
Serial Correlation ^a	$\chi^2(1)$ 0.385
Functional Form ^b	$\chi^2(1)$ 3.844
Normality ^c	$\chi^2(2)$ 1.600
Heteroscedasticity ^d	$\chi^2(1)$ 0.703

Notes: Figures in parentheses are *t*-values.

* denotes significance at the 10 per cent level.

** denotes significance at the 5 per cent level.

*** denotes significance at the 1 per cent level.

^a Lagrange multiplier test of residual serial correlation.

^b Ramsey's RESET test using the square of the fitted values.

^c Jarque-Bera test of skewness and kurtosis of residuals.

^d Breusch-Pagan-Godfrey test on the regression of squared residuals on squared fitted values

Critical values for the various diagnostic test at the 10 per cent significance are as follows:

$\chi(1) = 6.63$, $\chi(2) = 9.21$.

**Table C. 4 Error Correction Models:
Production Sector Development Expenditure**

Dependent Variable: $\Delta I PX$	Equation 5.2.3
Regressor	5.2.3a
Constant	17.547*** (3.96)
ΔIJP_{-1}	0.179** (2.66)
ΔIFP_{-1}	-0.269*** (-3.81)
ΔIOP_{-1}	-0.186 (-1.35)
ΔINS_{-1}	-0.067 (-0.62)
$\Delta IGDP_{-1}$	-0.079 (-0.02)
$\Delta I PX_{-1}$	-0.338* (-1.82)
ECM_{-1}	-0.387*** (-4.00)
R^2	0.67
F-Statistic	3.52
Std. Error of Regression	0.24
Durbin Watson-Statistic	2.28
<i>Diagnostic Tests</i>	
Serial Correlation ^a	$\chi^2(1)$ 0.934
Functional Form ^b	$\chi^2(1)$ 3.380
Normality ^c	$\chi^2(2)$ 0.242
Heteroscedasticity ^d	$\chi^2(1)$ 0.020

Notes: Figures in parentheses are *t*-values.

* denotes significance at the 10 per cent level.

** denotes significance at the 5 per cent level.

*** denotes significance at the 1 per cent level.

^a Lagrange multiplier test of residual serial correlation.

^b Ramsey's RESET test using the square of the fitted values.

^c Jarque-Bera test of skewness and kurtosis of residuals.

^d Breusch-Pagan-Godfrey test on the regression of squared residuals on squared fitted values

Critical values for the various diagnostic test at the 10 per cent significance are as follows:

$\chi(1) = 6.63$, $\chi(2) = 9.21$.

Table C. 5 Error Correction Models: Other Sectors Development Expenditure

Dependent Variable: ΔIOX		Equations 5.2.4	
Regressor		5.2.4a	5.2.4b
<i>Constant</i>		5.032*	4.316**
		(2.09)	(2.39)
ΔIJO_{-1}		-0.038**	-0.034**
		(-2.25)	(-2.49)
ΔIFO_{-1}		-0.019	-0.016
		(-0.70)	(-0.62)
ΔIOO_{-1}		1.191**	1.087***
		(2.85)	(3.16)
ΔINS_{-1}		-0.573**	-0.508**
		(2.17)	(-2.34)
$\Delta I GDP_{-1}$		-10.399	-9.293
		(-1.51)	(-1.49)
ΔIOX_{-1}		0.128	—
		(0.47)	
ECM_{-1}		-0.347*	-0.297**
		(-2.01)	(-2.25)
R^2		0.56	0.54
F-Statistic		2.16	2.64
Std. Error of Regression		0.49	0.47
Durbin Watson-Statistic		2.01	1.90
<i>Diagnostic Tests</i>			
Serial Correlation ^a	$\chi^2(1)$	0.008	0.062
Functional Form ^b	$\chi^2(1)$	0.725	0.015
Normality ^c	$\chi^2(2)$	1.221	1.156
Heteroscedasticity ^d	$\chi^2(1)$	5.731	5.297

Notes: Figures in parentheses are *t*-values.

* denotes significance at the 10 per cent level.

** denotes significance at the 5 per cent level.

*** denotes significance at the 1 per cent level.

^a Lagrange multiplier test of residual serial correlation.

^b Ramsey's RESET test using the square of the fitted values.

^c Jarque-Bera test of skewness and kurtosis of residuals.

^d Breusch-Pagan-Godfrey test on the regression of squared residuals on squared fitted values

Critical values for the various diagnostic test at the on per cent significance are as follows:

$\chi(1) = 6.63$, $\chi(2) = 9.21$.

Table C. 6 Error Correction Models: Domestic Revenue

Dependent Variable: ΔIRE		Equations 5.3		
Regressor		5.3a	5.3b	5.3c
Constant		2.783 (1.64)	2.571 (1.58)	-0.003 (-0.05)
ΔIJT_{-1}		-0.071 (-1.40)	-0.074 (-1.50)	-0.009 (-0.31)
ΔIFT_{-1}		-0.002 (-0.04)	0.006 (0.11)	0.053 (1.03)
ΔINS_{-1}		0.089 (1.14)	0.080 (1.06)	-0.020 (-0.47)
ΔGDP_{-1}		3.896* (1.80)	3.389 (1.72)	1.044 (0.77)
ΔIRE_{-1}		-0.171 (-0.63)	—	—
ECM_{-1}		-0.430 (-1.64)	-0.396 (-1.58)	—
R^2		0.30	0.28	0.15
F-Statistic		0.92	1.08	0.66
Std. Error of Regression		0.10	0.10	0.10
Durbin Watson-Statistic		2.14	2.35	2.07
Diagnostic Tests				
Serial Correlation ^a	$\chi^2(1)$	0.806	1.043	0.089
Functional Form ^b	$\chi^2(1)$	3.051	5.847	0.868
Normality ^c	$\chi^2(2)$	1.862	0.204	0.535
Heteroscedasticity ^d	$\chi^2(1)$	0.172	0.076	0.224

Notes: Figures in parentheses are *t*-values.

^a Lagrange multiplier test of residual serial correlation.

^b Ramsey's RESET test using the square of the fitted values.

^c Jarque-Bera test of skewness and kurtosis of residuals.

^d Breusch-Pagan-Godfrey test on the regression of squared residuals on squared fitted values

Critical values for the various diagnostic test at the on per cent significance are as follows:

$\chi(1) = 6.63$, $\chi(2) = 9.21$.

Table C.7 Estimated Correlation Matrix of Variables

	RECM51	RECM521	RECM522	RECM523	RECM524	RECM53
RECM51	1.00	0.62	0.14	0.22	-0.13	0.63
RECM521	0.62	1.00	0.32	-0.05	0.15	0.43
RECM522	0.14	0.32	1.00	0.42	0.41	0.68
RECM523	0.22	-0.05	0.42	1.00	0.41	0.65
RECM524	-0.13	0.15	0.41	0.41	1.00	0.42
RECM53	0.63	0.43	0.68	0.65	0.42	1.00

Notes: RECM51 is the residual of the equation (5.1),
RECM521 is the residual of the equation (5.2.1),
RECM522 is the residual of the equation (5.2.2),
RECM523 is the residual of the equation (5.2.3),
RECM524 is the residual of the equation (5.2.4), and
RECM53 is the residual of the equation (5.3).

Appendix D SIMULATION ANALYSIS

Pack and Pack (1990, 1993) argue that to understand the full scale of aid fungibility, it is useful to use a simulation technique. In this study, simulation is also used to examine the impacts of an increase in total sectoral aid *per capita* on expenditures and domestic revenue *per capita*. The simulation is proceeded in such a way that an increase in total sectoral aid is pro-rated to each sectoral aid grouping in proportion to its mean in each of the sectoral development expenditures, as well as in current expenditures and domestic revenue. Therefore, the results should be able to indicate the effects of changes in aid, on average, based on aid pattern in the past, taking into account the fungibility behaviour of aid. The change in each development expenditure category can be expressed by the following equation form:

$$dDE_j = \frac{dDE_j}{dJT_j} \left(\overline{\frac{JT_j}{AT_j}} \right) + \frac{dDE_j}{dFT_j} \left(\overline{\frac{FT_j}{AT_j}} \right) + \frac{dDE_j}{dOT_j} \left(\overline{\frac{OT_j}{AT_j}} \right) \quad (D.1)$$

where d denotes change,

— denotes average,

DE_j is development expenditure for sector j ,

JT_j is Japan's sectoral aid to sector j ,

FT_j is sectoral aid from all donors, excluding Japan, to sector j ,

AT_j is sectoral aid from all donors, including Japan, to sector j ,

OT_j is all sectoral aid to sectors other than sector j ,

Since the estimated regression coefficients in Chapter 5 are expressed in terms of elasticities, alternatively:

$$dDE_j = \beta_{J,j} \left(\overline{\frac{DE_j}{JT_j}} \right) \left(\overline{\frac{JT_j}{AT_j}} \right) + \beta_{F,j} \left(\overline{\frac{DE_j}{FT_j}} \right) \left(\overline{\frac{FT_j}{AT_j}} \right) + \beta_{O,j} \left(\overline{\frac{DE_j}{OT_j}} \right) \left(\overline{\frac{OT_j}{AT_j}} \right) \quad (D.2)$$

where $\beta_{J,j}$ is the estimated coefficient for Japan's sectoral aid to sector j ,

$\beta_{F,j}$ is the estimated coefficient for sectoral aid from all donors, excluding Japan, to sector j ,

$\beta_{O,j}$ is the estimated coefficient for all sectoral to sectors other than sector j ,

Similarly, for non-development current expenditure and domestic revenue:

$$dCE = \beta_{J,CE} \left(\frac{CE}{JT} \right) \left(\frac{JT}{AT} \right) + \beta_{F,CE} \left(\frac{CE}{FT} \right) \left(\frac{FT}{AT} \right) \quad (D.3)$$

where CE is non-development current expenditure,

JT is total sectoral aid from Japan,

AT is total sectoral aid from all donors, including Japan,

FT is total sectoral aid from all donors, excluding Japan.

$\beta_{J,CE}$ is the estimated coefficient for total Japan's sectoral aid in non-development current expenditure equation (5.1),

$\beta_{F,CE}$ is the estimated coefficient for total sectoral aid from all donors, excluding Japan, in non-development current expenditure equation (5.1),

And,

$$dRE = \beta_{J,RE} \left(\frac{RE}{JT} \right) \left(\frac{JT}{AT} \right) + \beta_{F,RE} \left(\frac{RE}{FT} \right) \left(\frac{FT}{AT} \right) \quad (D.4)$$

where RE is domestic revenue,

$\beta_{J,RE}$ is the estimated coefficient for total Japan's sectoral aid in domestic revenue equation (5.1),

$\beta_{F,RE}$ is the estimated coefficient for total sectoral aid from all donors, excluding Japan, in domestic revenue equation (5.1),

The results are summarised in Table D.1. Column (I) shows the average allocation of sectoral aid among different categories. Column (III) shows the sum of Column (II), which displays the components of the right hand side of equations (D.2), (D.3) and (D.4). The difference between the sum of the values in column (I) and the values in column (III) may indicate the presence of aid fungibility. In particular, if the change in expenditures (column III) is greater than the change in sectoral aid (column I), it could be said that there is a diversion of resources from other sectors. Also, if the value is smaller in column (III) than in column (I), it may suggest that aid allocated to a particular sector leaks into other sectors, or used for other purposes.

The results of this simulation analysis show that there is a possibility that diversion of resources takes place in all sectoral categories. In the social services and production sectors, an increase in sectoral aid results in a reduction of the respective development expenditures. In the economic services and other sectors, the induced increase in development expenditure exceeds the increase in aid allocated to these sectors, indicating that there is a diversion of resources from other sectoral categories. Moreover, it is found that one rupiah per capita increase in total sectoral aid leads to

0.61 rupiah per capita increase in non-development current expenditure and 1.33 rupiah per capita decrease in domestic revenue.

However, it should be noted that these results are estimated by using aid commitment data (OECD, 1996b). The estimates of the impact of change in aid, proportional to average values, may overstate the impact, given the fact that commitment aid values are generally greater than the actual disbursement values (Cashel-Cordo and Craig, 1990; van de Laar, 1987). Hence, the results of the simulation analysis is not incorporated in the main text of this study.

Table D.1
Change in Expenditures and Revenue as Total Sectoral Foreign Aid Changes by one Rupiah per capita, with Sectoral Aid Changes Proportional to Average Values

Equation	Column (I) Pro-rated change in foreign aid	Column (II) Changes in expenditure or revenue	Column (III) Total change in expenditure or revenue
Social Services Sector (SX)			
<i>JS</i>	0.117	0.315	-0.567
<i>FS</i>	0.221	-1.003	
<i>OS</i>		0.121	
Economic Services Sector (EX)			
<i>JE</i>	0.502	0.466	1.377
<i>FE</i>	0.469	0.769	
<i>OE</i>		0.142	
Production Sector (PX)			
<i>JP</i>	0.318	1.496	-0.581
<i>FP</i>	0.266	-1.687	
<i>OP</i>		-0.390	
Other Sectors (OX)			
<i>JO</i>	0.066	-0.649	-0.102
<i>FO</i>	0.044	-0.072	
<i>OO</i>		0.618	
Non-Development Current Expenditure (CE)			
<i>JT</i>		0.225	0.609
<i>FT</i>		0.384	
Domestic Revenue (RE)			
<i>JT</i>		-1.442	-1.334
<i>FT</i>		0.108	

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