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# **Does Aid Work?**

**A Cross-country  
Aid Efficiency Study**

**Master's thesis, 10p**

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## **1. Introduction**

Foreign aid and all kinds of support aiming at international development are of great importance for the developing nations. The majority of the nations in the third world are facing huge problems concerning poverty, health, political instability, corruption, environment and infrastructure. Foreign aid might be one instrument to help developing nations fight these problems, obtain sustainable growth and reduce poverty. However there are different opinions about its effect and foreign aid has been the root of many controversies and has been widely questioned and discussed during the last decade.

Since foreign aid is a scarce resource it is important how it is distributed, however, it is hard to agree upon if aid should be focused on the need for aid or the potential in the recipient country to allocate the resources in an efficient way.

Furthermore, one can wonder how effective aid is at triggering growth. Empirical research has claimed that aid might be useless in countries with political instability, bad institutional quality or in countries with tropical climate. Many of the poor nations in the world today have enormous structural problems making it hard for these countries to meet sustainable growth. Is the economic and technical assistance from the rich part of the world helping the developing countries and does it have positive effects on growth in these countries or is it in fact useless?

Why do we bother so much about the effect of aid on economic growth in the developing countries? Well, firstly growth has a direct effect through increased income for many poor households. This could and should increase the saving rates for these households and release resources that could be used to invest in human and economic development. The Millennium goal in the Human Development Report is to halve the number of people living below the poverty line and this cannot be done without economic growth.

Secondly, economic growth increases the official income and it is from official income most of the investments in human development like health, nutrition, education and infrastructure come from. However, growth is a necessary but not a sufficient condition for improving the living standards in the developing countries. In the Human Development Report from 1996, it was claimed that sustaining economic growth is very hard, if not impossible, to achieve without significant improvements in education and health.

Foreign aid is always a pressing issue. I believe that it is very interesting to analyse the development in the developing countries as well as the developed countries role in this development process. More knowledge about how to solve the problems in the third world is needed as well as more effort to gradually erase the enormous differences between the developing and the developed nations. While there is almost unlimited research on the economic development in the developed countries there is considerably less research made in the developing nations. This is, amongst other things, due to the lack of data for longer time periods in these countries. Therefore I find it to be a challenge to perform an empirical research with developing nations as observations considering its differences with the developed nations and its uncertain and unstable political, economical and social circumstances.

## **1.1 Aim**

According to panel-data regressions in earlier research, aid affects growth differently depending on which country it is directed to. But what induces these differences? According to Dollar and Burnside, 1997, aid works in countries with “good” policies. This conclusion has considerably influenced the distribution of aid to the third world. By constructing policy indexes I am going to analyse if aid has an effect on growth when taking into account the quality of policy. I will also include a number of other variables, such as e.g. institutional quality and a dummy for tropical climate, and these will be tested in a cross country regression. The difference from earlier research is that I will use alternative measures for trade and monetary policies in the policy index. The question is whether aid affects growth

positively in developing nations when taking into account the quality of policy and other variables. Also the report will assess if the construction and choice of variables in the policy index and in the regression can influence the outcome of the growth regression.

## **1.2 Method**

I have chosen to do an empirical analysis in order to see whether foreign aid and policy may impact the growth in developing countries. Applying regression analysis with cross-sectional data makes the empirical research in this paper. There is data for 65 developing countries during the time period 1970-1997. In order to take into account policy in the regression I have constructed two policy indexes that are included into the analysis.

## **1.3 Limitations**

This paper will concentrate on the empirical research and not go any deeper into the theoretical aspect of aid and growth. Furthermore the paper will cover the macroeconomic effects of aid on growth and not the microeconomic effects. It might be good to mention that earlier research have found different results about the effects of aid on growth, when looking at micro- and macro-levels. It seems as if there have been more significant positive relationships between aid and growth when applied on micro-level.

Another issue is the choice of growth in GDP pc as a measure human development. It is important to mention that even though, normally, growth in GDP pc and poverty has a negative relationship, there are exceptions. There are countries with the same level of GDP pc but with highly differing levels of poverty. One example is Vietnam and Zimbabwe. These two countries have approximately the same level of GDP pc but Vietnam has reached much further in human development.

Moreover there are problems with ruthless growth. This is according to research made in the Human Development Report in 2003. Ruthless growth means that the economic growth does not reach out to the poor people but instead it is widening the income gap between rich and poor. This could be a consequence of a higher share of the increase in GDP going to the rich households and/or that the country's government do not use the increase in GDP in an efficient way but is ignoring to invest in human development.

Despite these drawbacks with growth in GDP pc as a measure of human wellbeing, I have chosen to use this measure due to the simple fact that it is generally accepted and that there is lots of data available on this measure.

As always when dealing with developing countries, there will be a shortfall of data for countries as well as there will be, in some cases, doubtful data.

#### **1.4 Target group and Disposition**

This paper is mainly written for students in developments economics who wish to increase their understanding in the dilemma of measuring and assessing foreign aid. The paper is also written for all those with a general interest in the current research in foreign aid and its macroeconomic effects.

The rest of the paper is organised as follows. In section 2 there will be a general oversight of foreign aid, its problems, distribution and development over time. In section 3 earlier research in the subject will be discussed, in section 4, an explanation of the construction of the two policy indexes will be presented. In section 5, the method used in the empirical part of the report will be motivated and in section 6 the data chosen and used will be presented. Finally in section 7 the empirical results and the conclusion are discussed.

## **2. Foreign aid**

### **2.1. Introduction**

The main purpose of aid is to be considered as a development instrument, i.e. that the main purpose of aid is to reduce poverty through growth. However aid is given for many different purposes and in many different forms. In this chapter, these different forms of aid are introduced, and then the issues of measuring poverty are going to be examined. Furthermore the various opinions on the effect of aid on growth are discussed, followed by a quick introduction of Non-Governmental Organizations. Next the evolution and distribution of foreign aid in the world is presented.

### **2.2 Definition of foreign aid**

Foreign aid is mainly official and private development assistance from

- Specific nations or multinational aid donors or
- Non-governmental organisations (NGO's)

All transfers of resources from a developed country to a developing country could be called foreign aid. However there are some hidden forms of transfers of resources that should not be included in the definition of aid and they are all forms of capital transfers from private foreign investors since these are created from expected profits from trade and returns. Another example is beneficial tariffs from developed countries to developing countries export of industrial goods.

Foreign aid also comes in several forms, like e.g. in the form of money, goods and services, experts and knowledge. Aid can be grouped into four main groups: Project aid, program aid, technical assistance and emergency aid. <sup>1</sup>

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<sup>1</sup> Danielson Anders, lecture in Development economics D, fall 2004



Project aid can e.g. be aid going to a certain project like building schools or building factories to produce goods sent to education. This is the most common way of financing foreign aid.

Program aid is when aid, often in the form of money, goes straight into the government budget of the recipient country and an example of this is dept relief.

Technical assistance is an instrument to transfer knowledge, techniques or capacity in order to achieve greater self-reliance in the recipient country. One example could be to give grants to educate or train people from the developing country home or abroad or to send skilled professionals, like engineers or teachers, from rich to poor countries in order to cooperate with local professionals. The latter would then be a way to fill in the lack of expertise for functions in the recipient country. This form of aid is often associated with project aid. Most of the work from IMF is technical assistance.

Emergency aid is when money and nutrition is sent to countries or regions in catastrophic situations. The main purpose of emergency aid is to help people survive by helping them achieve basic needs. The problem with emergency aid is that it often arrives very late in the process since donors want proof of the catastrophe before donating resources.

To sum up one could say that foreign aid is all kinds of governmental aid, concessional loans and technical cooperation with the aim to transfer resources from developed countries to developing countries for the main purpose of promoting economic development and wealth.<sup>2</sup>

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<sup>2</sup> M. Todaro och S. Smith, Economic Development, eighth edition

### **2.3 Problems with measuring and estimating foreign aid**

There are mainly three problems with measuring aid. These are hard to correct but they should still be kept in mind when evaluating aid in order to get a better perception of the value of aid.

- Loans have to be paid back and therefore cost the lender more and benefit the lender less than the nominal value of the loan itself. Therefore it would be best to discount the dollar value of interest bearing loans before adding them to statistical data of aid.
  
- Aid can be tied to its source so that the loan or the aid must be used to buying goods and services from the donating country. Aid can also be tied to a certain project, i.e. the resources can only be used to a certain project. No matter in what way the aid or loan is tied; its real value is decreased due to this. The receiving country can be forced to buy goods from an expensive supplier or invest in a project not of the highest priority. Aid can also be tied to import capital-intensive goods and equipment leading to unemployment in the recipient country.
  
- We must also differ between nominal and real value of aid, especially during periods of high inflation. Aid is often presented in nominal form and if prices are deflated the value of the aid numbers can be totally different.

### **2.4 The main problems with foreign aid**

There are several problems with foreign aid, making it hard to measure and evaluate the effects of aid properly. This section will discuss problems existing in project and program aid as well as in technical assistance.

### 2.4.1 Problems with project aid

With project aid as there is a problem with aid dependency and recurrent costs, meaning that when the donor country starts to finance recurrent costs too due to aid dependency, this leads to, if aid ceases, that there is no one financing building of schools, school material and teacher salaries e.g. As a consequence there is no choice for the donor country but to continue financing these things and the aid donation continues. Many recipient countries are aware of this and their governments can take advantage of the situation. This is a problem hard to solve.

Another problem is when the recipient country has an interest in spending all the aid resources available at the time since if there is money left at the end of the aid-period, the next aid donation will be smaller. One solution could be to make the recipient government own parts of the project so that the recipient country's government finance themselves a certain fraction of the project. In that way it is also in the interest of the government to make the project work since it is also their resources at stake.

An additional problem is donor coordination due to incomplete information. It is easier to coordinate a project with the recipient country government if you are the only donor. However, donors are numerous and not coordinated and all are calling for their project to be implemented first. This makes it hard to obtain good data on foreign aid. Moreover most donor countries tend to favour in large amounts the social sectors such as health and education over e.g. public expenditure programs<sup>3</sup> and as a consequence low-priority, but still very important, sectors tend to be ignored.

In the Monterrey consensus<sup>4</sup> it is stated that every donor country must try to harmonize their donations in order to improve this problem of donor coordination. One way to improve the situation with donor coordination could be to channel all aid as budget support to the recipient country and let the government allocate the funds. However then the government might allocate aid only to the high priority

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<sup>3</sup> e.g. transportation

<sup>4</sup> The International Conference on Financing for Development (FfD), March 18-22, 2002 in Monterrey, Mexico

projects in order to please the donor countries and we are back at the lack of funding to low priority sectors. Halonen-Akatwijuka, 2004, suggests a joint database on planned projects and budget allocations in recipient countries as a solution of this donor coordination problem. The database should contain information about both current and future planned activities in order to improve the information for donor countries.

The problem with incomplete information also exists in the recipient countries since many donor organisations exist within the same country. This makes it hard for the recipient country to know what is actually happening and who finances what. E.g. in Vietnam, about 350 international NGO's, 25 official bilateral donors and 19 official multilateral donors were operating in the country accounting for over 8000 projects in 2002<sup>5</sup>.

Another problem with project aid or stand alone projects is the brain drain out of civil service. I.e. that competent agents is moved from their positions in the civil service (e.g. they might work in the education ministry or teaching at universities) to a new project financed by an aid donor country. This might cause a possible lack of competent personnel in the civil service where there already is a great need of such people.

#### 2.4.2 Problems with program aid

There are also problems concerning program aid, like making the developing country trust or believe in the entire development strategy. Most often this is not the case (except in the case of NGO's), and there is almost always problems with fungibility. Fungibility means that money cannot be earmarked. Often genuine differences concerning how to allocate public funds in the recipient country exists between the donor and recipient country. The donor might aim to increase funding of a priority sector while the recipient government responds to the increased aid by shifting funding away from the priority sector. So the aid might actually indirect finance some unproductive activity instead. One example of this is SIDA's

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<sup>5</sup> Halonen-Akatwijuka (2004), "Coordination failure in foreign aid"

financing of teacher salaries in Tanzania. This money would Tanzania get anyhow so SIDA is in effect financing something else<sup>6</sup>.

While incomplete information is bad for donor coordination, it might actually improve the fungibility problem since the recipient country does not have enough information to respond to the donors decisions<sup>7</sup>.

There is also a drawback when the recipient country lacks the capacity or knowledge needed to make use of and implement aid. This is often solved by technical assistance.

Conditionality is another issue. Conditionality is the goals or conditions the recipient country needs to fulfil in order to continue receive foreign aid from donors. These conditions are regarded as an instrument to prevent the recipient country to just spend the money in order to receive more the next period. However conditionality is often empty threats and does not seem to work.

#### 2.4.3 Problems with technical assistance

Technical cooperation is often bundled by donors and due to this, aid tying prevails. This is, as discussed above, not the optimum way of aid donation. In addition the recipient country and its government often accept professionals coming from a developed country even in cases when it is regarded as inefficient since these professionals sometimes act as a camouflaged form of subvention to the government budget.

As a consequence of the aid tying, it is the donors who drive the technical assistance and cooperation and the recipient country do not have much influence in the process. So most often the technical assistance projects are delivered according to the donor priorities that are not in accordance with the recipient government's expenditure priorities. As a consequence the ownership of the project is limited and

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<sup>6</sup> Danielson Anders, lecture in development economics D, 2004

<sup>7</sup> Halonen-Akatwijuka (2004), "Coordination failure in foreign aid"

also its sustainability that may lead to, as mentioned above, inefficient spending of aid resources.<sup>8</sup>

Moreover, when the expatriate experts have accomplished their work, they return to their countries, having failed to transfer the useful knowledge to the counterpart in the developing country so that a large part of the goal of the project is neglected<sup>9</sup>.

Another problem with foreign aid is on the donor side and concerns the bureaucracy of delivering foreign aid. This has been discussed by W. Easterly in his report “The cartel of good intentions: The problem of bureaucracy in foreign aid”. It seems like there is very unproductive and unnecessary bureaucracy in the process of delivering foreign aid making it inefficient and leading to the recommendation of letting more foreign aid be channelled through Non-governmental Organisations.

According to Danielson, Hoebink and Mongula (2002) the technical assistance can achieve its goals of achieving self-reliance and higher capacity in the recipient countries but only if donors, amongst other things, coordinate aid, educate home publics and develop capacity within aid organizations.

## **2.5 Opinions on the effects of foreign aid on growth**

There are and have always been many opinions regarding the effects of aid on growth in the developing world, and especially when it comes to the effects of official or governmental development assistance. The discussions regarding foreign aid have always been a source to disputes and controversies. The opinions are ranging from one extreme to another. The traditional economists argue that foreign aid has had a positive effect on growth and on the structural adjustment in many developing nations allowing for poverty reducing investments not possible otherwise, while critics claim that foreign aid have not had any effect at all, or even a negative effect.

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<sup>8</sup> Danielson, A, P. Hoebink and B. Mongula (2002) “Are Donors Ready for Change?”

<sup>9</sup> Danielson, A, P. Hoebink and B. Mongula (2002) “Are Donors Ready for Change?”

The critique against the official aid has been concentrated on the fact that it is far too focused on growth in the modern sector. This could, according to the critics, lead to a widening gap between the rich and the poor in developing countries. Some critics take the criticism even further, claiming that the official aid has had a negative influence on the development in the developing countries due to decreased growth and lower saving rates and growing inequalities in the income distribution. Other mean that the official aid programs have failed since they have been adapted by corrupt bureaucrats and decreased the initiatives in the third world. Some even argue that foreign aid is a form of colonialism.<sup>10</sup>

As if this was not enough, there has been a growing dissatisfaction with the foreign aid policy within the donor countries over the last two decades. This is due to domestic problems like unemployment, budget deficits and balance of payment problems. Tax-payers around the industrial world want to focus more on the domestic economic problems especially after realising that their part of taxes going to foreign aid often favour small elite groups in the developing countries, many richer than themselves. All this has decreased the interest of donating money and developing support has decreased, but at the same time the support towards non-governmental organisations has increased.

In section 3, research on the effects of aid on growth will be further discussed.

## **2.6 Non-Governmental Organisations**

Non-Governmental organisations have increased their significance and are today one of the fastest growing and most important factors concerning development support<sup>11</sup>. These are volunteering organisations that cooperate with and work together with the local organisations in the developing countries. Examples on NGO's are CARE. Project Hope, Amnesty international and Save the children.

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<sup>10</sup> M. Todaro och S. Smith, Economic Development, eighth edition

<sup>11</sup> M. Todaro och S. Smith, Economic Development, eighth edition

Between 1970 and 1990 the NGO's financing of projects and programs in developing nations increased from 1 billion dollars to over 55 billion dollars. Almost 50 percent came from the USA. Expressed in GDP pc the highest contributions to NGO's came from Sweden, Switzerland, Norway and Germany.<sup>12</sup>

Non-Governmental Organisations are important for mainly two reasons. Firstly, they are not as limited politically as official aid donors and they are mostly motivated for humanitarian reasons. The majority of the NGO's are working more efficiently on local level close to the people compared to the bilateral and multilateral aid programs.

Secondly, due to the fact that they are working close to the people on local level, they create a confidence with the people they want to help making them believe in their work and that their aid is not temporary or not serious. NGO's have received more space to act in the developing countries and gained more respect in the developed nation's governments. E.g. on the Copenhagen summit in 1995, USA promised that within 5 years, half of their aid should be channelled through NGO's. Even though this promise was not fulfilled it is still an indicator of the importance of NGO's for the poor countries development.

## **2.7 The development and distribution of foreign aid**

### **2.7.1. Development of foreign aid**

The volume of ODA<sup>13</sup> has increased yearly from 4,6 billion dollar in 1960 to 51 billion dollar in 1999. At the same time the share of developed countries GNP going to foreign aid has sunk steadily from 0.51 percent in 1960 to 0.22 percent in 2001. This can be compared to the fact that between 2001-2002 foreign aid from developed to developing countries increased by 5 percent, but despite this increase 31 of the 49 poorest countries in the world receive lower amounts of aid today, 8.55 percent of total GNP compared to 12.9 percent in 1990. This decrease of aid from

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<sup>12</sup> M. Todaro och S. Smith, Economic Development, eighth edition

<sup>13</sup> Official Development Assistance



the donor countries as share of GNP has hit hardest on the regions and countries most in need. One example is Sub-Saharan Africa and South Asia that received significantly less aid as a share of GNP per capita during the 1990's.<sup>14</sup>

The largest donor in absolute terms is USA that donated 9.1 billion dollars in 1999. But USA is also the country that donates the least to aid when measured as a share of GNP, only 0.1 percent in 1999. The average share of GNP going to foreign aid amongst the developed nations was 0.22 percent in 2001. The united nations international accepted goal 0.7 percent is only met by three European countries: Sweden, Netherlands and Denmark (0.7 percent, 0.79 percent and 1.01 percent)<sup>15</sup>. If USA should increase their share going to foreign aid it could make a huge difference. Even if they only increase their share to 0.2 percent it would mean about 10 billion dollar extra going to developing countries. This is a huge sum from the poor countries perspectives. Table 1, shows how much de largest donor countries donated in absolute terms and as a share of GNP in 1985 and in 1999.

**Table 1. The aid flow from the 10 largest donor countries 1985 and 1999**

| country       | 1985        |             | 1999        |             |
|---------------|-------------|-------------|-------------|-------------|
|               | bn dollar   | % of GNP    | bn dollar   | % of GNP    |
| Canada        | 1.6         | 0.49        | 1.7         | 0.28        |
| Danmark       | n.a.        | n.a.        | 1.7         | 1.01        |
| France        | 4           | 0.78        | 5.6         | 0.39        |
| Germany       | 2.9         | 0.47        | 5.5         | 0.26        |
| Italy         | 1.1         | 0.26        | 1.8         | 0.15        |
| Japan         | 3.8         | 0.29        | 15.3        | 0.35        |
| Netherlands   | 1.1         | 0.91        | 3.1         | 0.79        |
| Sweden        | n.a.        | n.a.        | 1.6         | 0.7         |
| Great Britain | 1.5         | 0.33        | 3.4         | 0.23        |
| USA           | 9.4         | 0.24        | 9.1         | 0.1         |
| <b>Summa</b>  | <b>29.4</b> | <b>0.35</b> | <b>56.4</b> | <b>0.29</b> |

source: Economic development 8<sup>th</sup> edition, page 649

In September 2002, during the world summit for sustaining development in Johannesburg, South Africa, it was confirmed that there is an enormous need for an increase of foreign aid towards the developing nations in the world and that more efforts from the part of the rich countries is needed in order to reach the goal of 0.7

<sup>14</sup> Human development report 2003

<sup>15</sup> Decided 1970, UN general assembly

percent as a share of GNP. If the developed nations do not act, it will be hard for the poor countries to reach their development goal.

It is hard to appreciate exactly how much extra aid is needed, but later research claims that aid needs to increase by about 40-100 billion dollars a year. The United Nations Cedula commission demands 50 billion dollar extra a year, which should mean an increase to 0.43 percent as a share of rich countries GNP. This is much less than the goal for 0.7 percent<sup>16</sup>.

### 2.7.2. Distribution of foreign aid

One might expect that foreign aid goes to the poorest countries, since this would be the most effective way of distributing aid when regarding aid as a mean for recipient countries to have the possibility to develop and reduce poverty. However this is not the case. It is the Upper-Middle Income countries that receive a lot of aid. The main reason for this is that developed countries donate foreign aid for economic, politic and sometimes military reasons rather than for human development or poverty reduction reasons. The data presented below come from M. Todaro and S. Smith, Economic Development, eighth edition.

There are also clear regional differences in the distribution of aid. In South Asia, where about 50 percent of the world's poor lives, 3 dollars per capita of foreign aid are donated. The Middle East which has an income per capita five times as high as in South Asia receives 18 dollar per capita of foreign aid. Even though Europe and Central Asia has an income four times as high as Sub Saharan Africa they receive a lot more of foreign aid.

In 1999, only eight countries received more than 1 billion dollars of foreign aid. These were Israel, India, Indonesia, Russia, Thailand, Bangladesh, Bosnia-Herzegovina, China and Egypt. Looking at aid per capita, the inhabitants in Israel received 148 dollar per capita and worth to mention is that Israel is classified as a developed country by the World Bank. India received 1 dollar per capita and China

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<sup>16</sup> Human development report 2003

that is a richer country than India received 2 dollars per person in foreign aid. That is, more aid was going to China despite the fact that India is a poorer country. This shows clearly that foreign aid is not directed to the poorest countries that might be the ones most in need of financial support.

Middle-income developing countries like e.g. Jordan, Poland and Thailand received 91 dollar, 25 dollar and 17 dollar per capita of foreign aid on average. These countries receive foreign aid mostly for political and economical reasons and not because they are most in need of it.

On average, as a percentage of GNP, foreign aid from developed countries to developing countries has decreased the last years and aid per capita has fallen significantly for many of the poor countries in the world. Thus the allocation of foreign aid do not depend on which countries have the largest need of financial and material support but seems to be determined by political and economical factors. Multilateral aid seems to be more rational and fair, but here too the richer countries seem to attract and receive more resources than the poor countries.

Svensson, 1999, found in his study that during the 1980's there were more foreign aid directed towards more democratic countries than in the 1990's. He claims furthermore that the level of democracy in the recipient countries has a strong influence on the effect of foreign aid on growth.

Dollar and Burnside, 2004, found in their study that foreign aid and institutional quality have not been correlated during the 1980's. However, the allocation of foreign aid from developed to developing countries changed under 1990's and Dollar and Burnside's study shows that developed countries to a much higher degree than before choose to direct their foreign aid towards countries with better institutional quality.

## **2.8 Conclusion**

In this chapter foreign aid was defined as all kinds of official aid, concessional loans and technical cooperation with the aim of transferring resources from developed to developing countries in order to promote economic and social development and welfare. Foreign aid can be grouped into four categories, project aid, program aid, technical assistance and emergency aid.

Furthermore we saw that there are several problems with measuring and estimating aid. Next the overall problems with foreign aid were presented like donor coordination problems, aid dependency and fungibility.

There are two main opinions on the effect of aid on growth in developing countries. One side claims that foreign aid has a positive influence on growth in developing countries while the other side believes that it has no effect or even a negative effect on growth.

Furthermore the Non-governmental organisations and their importance have increased as well as the support towards these organisations and their main advantage is that they are working close to the people on a local level. It can be concluded that the importance of these organisations in developing nations should not be underestimated in the future.

Finally the development and distribution of foreign aid was presented. In short, foreign aid to developing countries has increased in absolute terms but as percentage of GDP foreign aid from developed nations to developing nations has decreased and there are only a few countries that succeeds to maintain the UN international goal of 0.7 percent of GDP. The past years the financial support has decreased towards the most poor countries so the distribution of foreign aid has been redistributed in a way unfavourable to the countries most in need.

## **3. Research**

### **3.1 Introduction**

This chapter will discuss the empirical research so far on the effects of aid on growth. First the link aid-savings and savings-growth will be discussed. This is the “old” way of assessing aid effectiveness and this empirical research is built with the theoretical Harrod-Domar model as foundation. Furthermore cross-country studies on aid effectiveness will be presented and discussed.

Then we continue by looking at the link aid-growth. There are of course differing opinions on the effect of aid on growth in the developing world. However, in 2000, Dollar and Burnside claimed that aid has a relationship with growth, but that it is conditional upon good policies in the recipient country. This is the main conclusion in the World Bank’s policy research report in 1998, *Assessing aid*. The key theme of this report is that money or financial resources has a big impact, but only if countries have good economic institutions and policies. However there has been some critique against this conclusion and the main points is discussed in section 3.3.

### **3.2 Aid, investment, savings and growth**

Early growth regressions put growth on one side and aid on the other side as an explaining variable. However, these cross-country relations did not get any good results about the aid effect on growth. Rather there was a negative effect of aid on growth.

So studies on aid effectiveness started to concentrate on assessing the link aid-savings-investment-growth. This way of analysing aid effectiveness is built on the theoretical Harrod-Domar model. The remarkable thing about this model is that it “died” long ago. Its founders<sup>17</sup> admit that it is not a suitable growth model, but due to its simple prediction it is still applied today to determine the required investment

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<sup>17</sup> Evsey Domar and Rod Harrod

rate for the target growth rate in developing countries. The “financing gap” is the difference between the required investment and available resources and donors fill this gap with foreign aid as an attempt to increase the growth rate and reach the target growth rate. Since this model is behind economic policy and aid allocation today, several economists have tested it.

William Easterly analysed how well the Harrod-Domar model predicted the data and found out that it fails empirically. He started to test the aid-investment link and continued with the investment-growth link.

### 3.2.1 Aid-investment

According to the Harrod-Domar model there should be a one-to-one relationship between aid and investment. And due to conditionality (requiring recipient countries to increase their saving rates even more) this relationship should be even greater than one. When tested on 88 countries during the time period 1965-1995, Easterly found that only 6 out of 88 countries had a positive and significant coefficient greater than one. Amongst these six we have China and Hong-Kong, which do not receive any great amounts of aid. 60 percent of the countries showed a negative relationship between foreign aid and investment. So the investment and aid did not evolve the way it was expected according to the Harrod-Domar model.

### 3.2.2 Investment-growth

According to the Harrod-Domar growth model there should be a linear relationship between investment and growth. Easterly wanted to test whether this linear relationship had any predictive power i.e. can a constant ICOR<sup>18</sup> predict growth? When allowing ICOR to vary across 138 countries with at least ten observations on growth and lagged investment Easterly found that only a small fraction of countries had a positive and significant relationship between investment and growth. An even smaller fraction was in the ICOR range between 2 and 5.

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<sup>18</sup> Incremental Capital Output Ratio

The conclusion of Easterly is when having looked at both aid to investment and investment to growth, that the Harrod-Domar growth model only fits one country: Tunisia. For the rest 137 countries, investment is necessary but not sufficient. At short-run horizon there is no evidence that investment is a necessary condition for growth. Easterly concludes that there are much better ways to allocate aid than using the financial gap Harrod-Domar model.

But Harrod-Domar growth model is still alive today in many international organisations, e.g. in the World Bank and the IMF. Moreover it has been shown that economists have been using the model even when it clearly did not work. One example is Zambia that according to the Harrod-Domar prediction model should be an industrial country today due to high inflow of aid and initial high investments. Zambia initially had a high investment rate in the country but when aid started to flow into the country, the investment rate went down and the investments did not yield short-run growth<sup>19</sup>. However economists have started to analyse and predict aid efficiency in other ways. Some of the results are discussed in the next section.

### **3.3 Cross country aid effectiveness studies**

The “last generation” empirical results regarding aid effectiveness are differing somewhat. Boone (1994, 1996) was in his report claiming that aid has no effect on investment and growth in standard neo-classical models. This is due to the fact that aid goes in the majority of cases to consumption rather than production. Nor would aid benefit the poor if you look at HDI (Human Development Index) according to Boone. His study was made on 90 countries during a time span of 20 years. And his study has been criticised by several economists like e.g. by Hadjimichael et al. (1995), Durberry et al. (1998), Lensink and White (1999), and Burnside and Dollar (2000) which all find a positive relationship between aid and growth. The reason for these differing results is that Boone treats the relationship between aid and growth as linear while the other studies treat the relationship as non-linear.

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<sup>19</sup> Easterly William (1999), “ the ghost of financing gap: how the Harrod-Domar growth model still haunts development economics”

However the formulation of this non-linear regression differs between these four studies. Dollar and Burnside use an interaction between a policy index and aid while the other three studies use aid squared as regressor.

All the other three studies also take into account how policy impacts aid effectiveness in a way. Hadjimichael et al. talk about absorptive capacity, Durbarray et al. discuss Dutch disease<sup>20</sup> problems and capacity constraints and Lensink and White refer to inappropriate technology and lack of institutional quality due to aid inflow.

Burnside and Dollar, on the other hand, focus explicitly on the impact of policy on aid effectiveness.

According to Burnside and Dollar (1997, 2004) aid only works in countries with good policy environments i.e. in countries with low inflation, openness to trade, small budget deficits, strong rule of law and a competent bureaucracy. This conclusion has led more aid donors to reallocate aid towards countries with good policies. Dollar and Burnside, 2004, found that correlation between foreign aid and institutional quality have changed during the 1990's when developed countries to a much higher degree than before choose to direct their foreign aid towards countries with better institutional quality.

But what if the effectiveness of aid is not policy induced but due to other poor initial conditions, then the allocation of aid would look different. Apparently the results and conclusions of Burnside and Dollar have a major effect on aid policy and needs to be critically analysed and questioned. This is done in the following section.

### **3.4 Critique against “aid, policy and growth” and “assessing aid”**

There are several points that are criticised in the report by Dollar and Burnside, and the world development report “assessing aid”. Dalgaard, Hansen and Tarp, 2003, have summarised some of them in their report “Empirics on Aid, Growth and

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<sup>20</sup> poor management of the exchange rate and domestic fiscal and monetary policy



Policy”. The first point is regarding the policy index and the relationship between aid, policy and growth.

1. There is a general agreement that a good policy environment matters for growth and aid effectiveness. This is because good policy environment should normally increase the productivity of investments financed by aid. But does that mean that bad policies are detrimental for growth and that aid is not useful in the development process of poor countries? Is aid a clear and simple waste in countries with bad policies?

Dollar and Burnside's report in 1997 was used as background for the policy recommendations made in the World Bank policy research report in 1998 *assessing aid*. The main result was that aid led to growth, but only in countries with sufficiently good macroeconomic performance. The influence of policy on the effect of aid on growth was in the regression accounted for by an interaction term on aid and a policy index. The Burnside-Dollar policy index is given by.

$$Policy = 1.28 + 6.85 Budget\ surplus - 1.4 Inflation + 2.16 Openness$$

In addition to these central policy variables other political and institutional variables are included like development of financial markets measured by M2/GDP, impact of political stability and bureaucracy through ethnic fractionalisation, assassinations and a measure of institutional quality, ICRG. Moreover initial GDP pc<sup>21</sup> and regional dummies for Sub Saharan Africa and East Asia are included in the regression. Burnside and Dollar use a measure of aid that is constructed by Chang, Fernandez-Arias and Serven (1998) (i.e. "Effective Development Assistance") and is given as percentage of GDP.

Their results are that the impact of aid is a positive function of the level of policy, and a negative function of the level of aid. It is these results that are the empirical background for the claim that aid only works in a good policy environment.

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<sup>21</sup> included to capture conditional convergence effects

There is a general agreement that policies and aid interact, but there is a disagreement of which policy indexes or which variables of policies actually interacts with and determines the effect of aid. This influences the construction of a policy index.

The relationship between the Burnside-Dollar policy index and aid is statistically insignificant according to the results of a number of researchers such as Dalgaard and Hansen (2001), Hansen and Tarp (2000, 2001), Hudson and Mosley (2001), Lensink and White (2001) and Lu and Ram (2001). Some studies have even found a negative relationship between the two variables when including the interaction between vulnerability and aid (Guillaumont and Chauvet 2001). It seems as if the only study actually supporting the Burnside-Dollar interaction term is Collier and Dehn (2001) who includes export price shocks in the model. Policies may be both substitutes and complements to aid and as a consequence this might make the net effect of a policy index insignificant. These findings are of great importance because if the results of Dollar and Burnside are in fact misleading then the aid may be faulty allocated.

Hansen and Tarp (2001) find that entering the square of aid drives out the significance of Burnside and Dollar's aid $\times$ policy, and makes the simple aid term significant too so aid has a positive impact on real GDP pc growth with diminishing returns implying a non linear relationship between growth and aid according to Hansen and Tarp.

In addition Hadjimichael et al. (1995), Durberry et al. (1998), and Lensink and White (1999) also have found positive, but decreasing marginal returns to aid flows, by the introduction of aid squared.

2. The second point that is criticised by Hansen and Tarp is the lack of important variables like Climate-related variables. Aid seems less effective in geographical tropics since tropical climate effects productivity and influence development of e.g. institutions (variations in institutions may matter for aid as impact on productivity). Why this is so is rather straight forward; according to

studies made by Bloom and Sachs (1998) Gallup, Sachs and Mellinger (1999) and Sachs (2001,2003) tropical land area, tropical diseases such as malaria affect the growth of GDP pc significantly from 1965 to 1990. Although through which channels climate affects growth is under debate, there is no question that climate do influence growth.

Dalgaard, Hansen and Tarp put up a new regression including the fraction of land in the tropics and an interaction term involving aid. Their results were that the interaction between aid and policy becomes statistically insignificant, while aid and the interaction between aid and the fraction of land in the tropics are both highly significant. So according to Dalgaard, Hansen and Tarp aid has a stronger positive impact on growth in countries outside the tropical region, while the impact is much smaller in the tropics.

3. The third point criticised is the aid allocation rule using the CPIA<sup>22</sup> index: Collier and Dollar did a growth regression, in which the impact of aid varies with policy performance measured by the World Bank's CPIA index. An interaction term between aid and CPIA is highly significant and positive according to the study of Collier and Dollar and this leads to the statement that aid should be directed towards poor countries with good policies (high CPIA scores).

Dalgaard, Hansen and Tarp who doubt the importance and correctness in using CPIA in regressions and as an aid allocation rule criticize this statement of Collier and Dollar. To test CPIA they combine the CPIA with the climate-related variable and Dalgaard, Hansen and Tarp (2003) finds a negative relationship between the two variables. They believe that there are three major problems with the CPIA index:

a) Endogeneity in the CPIA: That is that the CPIA index is determined by the independent variables and/or the dependent variable in the regression making the coefficients in the regression biased.

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<sup>22</sup> Country Policy and Institutional Assessment index

b) Granger Causality: The CPIA index may be granger caused by past growth performance and if this is the case it should not be used as an exogenous variable in forecast and policy simulations. (Dalgaard, Hansen and Tarp (2003), Chong and Calderon (2000).)

c) High rank correlation: There is a high rank correlation between the CPIA and the fraction of land in the tropics. So the positive interaction between aid and CPIA obtained in Collier and Dollar (2001, 2002), may well be caused by the low impact of aid in the tropical region. So should we according to the aid allocation rule stop giving aid to countries in the tropics since they, in most cases, have a low CPIA index?

These findings all question the aid allocation rule. Dalgaard, Hansen and Tarp conclude in their report that aid has a significant positive impact on growth in many countries. They find that there is a robust pattern over the last thirty years that aid seems to have been far less effective in tropical areas.

### **3.5 Conclusion research**

To sum up, the Harrod-Domar growth model do not work empirically. Despite this fact the majority of economists use the model in deciding aid allocation and economic policy due to its ease of prediction.

The main results of the cross-country growth regressions have been that aid on average triggers growth

- in countries where economic policies are good
- in the majority of developing countries although with diminishing returns
- in countries that are not situated in the tropics

The findings of Dollar and Burnside that aid effects growth positively but only in countries with good policy is overall accepted by important institutions like the World Bank and the IMF and it has been seen that the aid allocation has changed

since these findings became official. However a lot of critique has been directed towards Dollar and Burnside and “Assessing aid”. Most of the critique point at the method used in the report but also at the variables included or excluded and on the construction of the policy index.

Dalgaard, Hansen and Tarp also find that whether the recipient country is situated in the tropics or not influence the effectiveness of aid on growth. I.e. aid has less positive influence in tropical countries.

The research up until today have helped me decide which kind of regression to use in my analysis and which variables to include.

## 4. Construction and interpretations of policy indexes

### 4.1 Introduction

As mentioned before policies may be both substitutes and complements to aid and as a consequence this might make the net effect of a policy index insignificant. This is a problem that needs to be considered when assessing the effects of the policy index in the growth regression.

It is important to think about how an index is constructed and how to interpret the variables included. It is also important that the variables chosen to be included in the index have the right meaning. E.g. in the Dollar-Burnside institutional quality index they include a variable “rule of law”. Countries with many and hard penalties are regarded as more “legal” countries. But this makes countries like e.g. Pakistan a relatively legal country since they cut the hand of on thieves as punishment, and this is far from an indication of a developed country or an indication of good institution.

Furthermore there are two ways to construct an index. The first is simply to run a regression with growth on the left hand side and the policy variables on the right hand side. Then the coefficients are the weights on the variables. These weights are then used to calculate the policy index.

Another way of constructing an index is to group the variables chosen into categories. E.g. if a country have inflation that lies between 1 and 2 percent then they get 1 “point”, if they have inflation lying between 2-4 percent they get 2 “points” and so on. Then the “points” are added up and divided by the number of variables used to get the index.

I have chosen to make use of both ways possible to construct the policy index. I want to see how important the way of constructing the index is to the outcome in the growth regression.

In chapter 4.2 the variables chosen to be included in the policy index are defined. Then in section 4.3 the first kind of policy index will be constructed and the weights on the variables, i.e. the coefficients will be presented as well as the method used to find these weights. Furthermore a sensitivity analysis will be made. In section 4.4 the second kind of policy index will be constructed and presented with the same variables as in the first index. Finally section 4.5 will summarize the chapter.

## **4.2 Choice of variables**

In the Dollar and Burnside policy index three variables are included to capture monetary, fiscal and trade policies: inflation, budget surplus and openness to trade. I am going to find alternative measures of the openness to trade and inflation and then investigate whether this has an impact on the regression when assessing aid efficiency. The variables are financial depth as measured by M2/GDP, openness to trade as measured by the black market premium and budget balance.

### 4.2.1. Money supply

As an alternative measure of monetary policy I will include the monetary development or financial depth, measured as M2 in relation to GDP. The data is taken from the Dalgaard et al 2004 dataset<sup>23</sup>. One interesting point to make here is that in the Dollar and Burnside report they chose inflation as a measure of monetary policy in the construction of their policy index; however they also include M2 in relation to GDP in the regression which means that they in fact included two measures of monetary policy. This might be misleading since there is a long run relationship between these two measures namely that inflation is determined by the rate of money growth. According to economic theory, an increase in inflation reduces money holdings relative to income. Both money supply and inflation also affects the exchange rate: high inflation rates have depreciating currencies and rapidly expanding money supplies tend to have a depreciating exchange rate vis-à-vis countries with low inflation and slowly expanding money supply. Therefore I

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<sup>23</sup> Dalgaard, Hansen and Tarp (2003) “On the Empirics of Foreign Aid and Growth”

believe that one of these measures is enough in the regression. I have chosen to use the monetary development. I expect that the financial development in terms of an increase in M2/GDP will have a positive relationship with growth due to its effect on interest rates, savings and investments.

#### 4.2.2 Openness to trade

Sachs-Warner trade openness indicator which is based principally on five components; Black market premium larger than 20 %, Export marketing, Socialism, Own-imported-weighted average frequency of non-tariff measures on capital goods and intermediates larger than 0.4 and Own-imported-weighted average tariff on capital goods and intermediates larger than 0.4. For closer details on these components see appendix 2. This measure has been criticized for being subjective, in e.g. how it classifies socialism, and for being vague; being closed can mean different things. Therefore, I have chosen not to use the Sachs-Warner index as a measure of trade openness but instead use only the Black market premium. I found data at the World Bank database for global development network.

The Black market premium for foreign exchange is a proxy for the price level of those transactions which take place at a higher level than a legal maximum. The premium between the black market exchange rate and the official rate indicates the strictness of government exchange controls.

The black market exchange rate is market determined and is more volatile than the official rate and this is due to the risk of being caught, eagerness to go abroad, effects of political events, and speculation of a possible devaluation of the official rate. A black market develops when some people are willing to buy or sell currency at prices higher than the legal maximum despite the risks involved of being caught. It is the foreign exchange market restrictions that lead to this emergence of the black market whereas other administrative measures, such as import tariffs, import licenses, quotas, and so on, only exert some influence on this exchange rate.



### 4.2.3 Budget Surplus

I have chosen to use the budget surplus measure as Burnside and Dollar used in their policy index. This is simply because I have not found any good alternative measure on fiscal policy. I tried to use government consumption but without any good results. The overall budget surplus is measured as percentage of GDP and includes grants. The data is taken from the Dalgaard et al dataset<sup>24</sup>.

The budget surplus is included in the policy index as a measure of fiscal policy. A budget surplus is good, indicating that the country have financial resources that can be used to increase e.g. government consumption since their income exceeds its spending. In the opposite case with a budget deficit, the country must find ways to finance this deficit in order to increase the income and decrease the expenditures. There are several ways of doing this such as promoting exports or limiting imports through import substitution, currency devaluation, reduce domestic demand in order to lower imports, encourage more private foreign direct or portfolio investments or expanding their stocks of official monetary reserves but the most common way to finance a budget deficit is through borrowing from international commercial banks or seeking more foreign aid assistance. There is then the risk of increased interest burden and dept and this should have a negative effect on the economy.

So I expect that a budget surplus has a positive effect on growth and that a budget deficit has a negative effect.

### 4.3 weights on variables in index 1

To check for any correlation I did a correlation matrix over all the variables I wanted to include in the policy index. If the variables are too correlated, i.e. if there is a too strong linear relationship between the variables, then there is risk for multicollinearity to exist. Multicollinearity is when two or more variables,  $x_i$ , contains the same information about  $y_i$ . The results are shown below:

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<sup>24</sup>Dalgaard, Hansen and Tarp (2003), "On the Empirics of Foreign Aid and Growth"

|               | BB        | BLMAR     | M2/GDP    |
|---------------|-----------|-----------|-----------|
| <b>BB</b>     | 1.000000  | -0.072361 | -0.130075 |
| <b>BLMAR</b>  | -0.072361 | 1.000000  | -0.071313 |
| <b>M2/GDP</b> | -0.130075 | -0.071313 | 1.000000  |

As can be seen there are no strong correlation between the three variables.

When regressing these three variables against growth I get the following results:

| Dependent variable: GR    |                    |                |
|---------------------------|--------------------|----------------|
| Method: Least squares     |                    |                |
| Included observations: 65 |                    |                |
|                           | <b>coefficient</b> | <b>p-value</b> |
| <b>C</b>                  | 1.655799           | 0.0154         |
| <b>BB</b>                 | 0.281429           | 0.0012         |
| <b>BLMAR</b>              | -0.572916          | 0.0421         |
| <b>M2/GDP</b>             | 0.057723           | 0.0007         |
| <b>R-squared</b>          | 0.315812           |                |

All three variables are significant on the 5 percent level. The budget surplus (BB) has a p-value of 0.0012, the black market premium (LOGBLACK) 0.042 and the money supply (M2\_GDP) has a p-value of 0.0. The coefficient for trade or in this case the black market premium is negative since the lower black market premium a country has the higher potential for growth. My policy index is:

$$\text{Growth} = 1.66 + 0.28 * \text{budgetsurplus} - 0.57 * \text{black market premium} + 0.06 * \text{M2/GDP}$$

The lower value on the coefficients in the policy index might be a consequence of the construction of the variables. The financial depth is expressed as a fraction of GDP while inflation in the Dollar-Burnside policy index is in percent. It can also be a consequence of that this index is based on cross-country data, while the Burnside-Dollar index include time dummies.

If the change in the policy index does have an influence in the regression then this is a clear sign of the doubtfulness and sensitivity of the report made by Dollar and Burnside.

In order to find out if a small change in the parameters results in a relatively large change in the outcome, in this case the p-value, a sensitivity analysis was made. If the p-value changes relatively much when changing a parameter then the outcomes are sensitive to that parameter. I changed the coefficients one at the time by 10 percent. The results from the sensitivity analysis can be seen in appendix 3. A ten percentage change in any of the variables did not change the p-value indicating that the results are not sensitive to any of the parameters.

#### **4.4 Policy Index 2**

As an alternative to the first policy index I have ranked all the three variables into 6 categories, where 6 is the best rank and 1 is the worst. Then I added up each countries “points” and divided it by three to get the policy index. Then each country got a number between 1.67 and 4.33. The countries between 1.67 and 2.67 get 1, the countries between 3.00 and 3.33 get 2 and the countries between 3.67 and 4.33 get 3. So the countries get the value 1, 2 or 3 where 3 is the best alternative i.e. good policies, with good budget balance, low black market premium and high monetary development.

Of course there are drawbacks with this kind of index. I plotted the policy index in order to see whether there were any clusters in the observations. This is quite important when constructing this kind of index since if all the observations are evenly spread then there is no point in grouping the observations in different groups. The spreadsheet of the policy index can be seen in appendix 4. As can be seen there are no clear clusters, however I think it is defensible to group the observations into three groups.

## **4.5 Summary**

In this chapter I defined the policy index as a function of the budget surplus, the black market premium and the monetary development. I constructed two kinds of policy indexes in order to see whether the formulation of the policy index, when using the same variables, have an impact on the final result in the growth and aid regression.

## **5. Data**

### **5.1 Introduction**

This chapter describes the data used and the variables chosen in the regression analysis. There is data for 65 countries. The time period is between 1970 and 1997. The software used to perform the regression is e-views 3.1.

Worth to mention is that I would have liked to include a variable for human development such as education or population growth. However these variables seem to be highly correlated with several of the other variables included. This fact makes it impossible to include these kinds of variables.

### **5.2 Dependent variable**

The dependent variable is growth measured as average growth rate of real GDP per capita, since the report want to see what effect aid has had on growth in the Asian countries. The data is World Bank data from 2002 and taken from the Dalgaard et al 2004 dataset.

### **5.3 Independent variables**

In the regression analysis the following variables are chosen to be included as independent variables: Initial level of real GDP per capita, aid as a share of GDP, the policy indexes, dummy variable for the countries situated in the tropics, dummy variables for countries situated in the Eastern Asia and in Central America and the freedom house index.

### 5.3.1 Initial GDP

The initial GDP per capita is measured by the natural logarithm of GDP per capita for the first year in the period i.e. for 1970. The GDP per capita is in constant 1985 dollars.<sup>25</sup>

The reason for including the initial level of real GDP per capita is to see whether there has been convergence between the developing countries. It has been claimed that there have been a convergence so that the poorer countries have grown faster and the richer slower so as there have been a “catching-up” process in the world. However there seem to be little proof for this kind of statement when looking at all the countries of the world. However there has been a clear convergence between the industrial countries in the rich part of the world. I include initial real GDP to see whether there has been any convergence between the countries in the developing world.

### 5.3.2 Foreign aid

The same measure of foreign aid as Dollar and Burnside, i.e. EDA (Effective Development assistance) computed by Chang et al. will be used. The EDA is in 1985 dollars and converted to that by using the World Import Unit Value Index from IMF 2002 and is expressed as percentage of GDP. The difference from net ODA (Official Development Assistance) computed by DAC is that firstly that the EDA do not take into account technical assistance, probably since it might benefit the consultants more than the recipient government. Secondly, the EDA includes all disbursement loans at their net present value while net ODA only includes disbursement of concessional loans. The EDA is converted into constant 1985 dollars<sup>26</sup> and then divided into real GDP from Penn World Tables 5.5 (Summers and Heston, 1991).

I expect that there will be a positive relationship between aid and growth. The alternative would be that aid does not have any effect at all on growth in the

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<sup>25</sup> constructed by Summers and Heston 1991

<sup>26</sup> using the IMF's world export unit value Index

recipient countries. However, it seems strange that all these resources should not have any effect whatsoever in the developing countries.

### 5.3.3 Policy index 1 and 2

I will use policy indexes in order to take into account the quality of policy in the developing countries. In section 4 you can read about the construction of the two indexes and choice of variables included. Variables included are measures of fiscal, monetary and trade policies and are: the log of the black market premium, monetary development as measured by M2 divided by GDP and finally the budget surplus in relation to GDP.

The first policy index is:  $\text{Growth} = 1.66 + 0.28 * \text{budgetsurplus} - 0.57 * \text{black market premium} + 0.06 * \text{M2/GDP}$

And the second policy index has grouped the countries into three categories where 1 is political instability and 3 is political stability.

As discussed before, it is the Dollar and Burnside report that makes me want to include this variable. I want to see how important the choice of variables in the indexes is as well as the construction of the index. I expect that better policies will have a positive effect on growth.

### 5.3.4 Institutional quality

Instead of using the measure of institutional quality used in Dollar and Burnside as well as in other reports I am going to use only the freedom house measure. The reason is, amongst other things, that rule of law that is included in the kzk measure is misleading as mentioned in chapter 4.

The freedom house measure democracy includes political rights and civil liberties. Political rights and Civil liberties are measured on a one-to one scale and these can

range from 1 to 7 where 7 is the worst case scenario, i.e. no political rights or civil liberties. The ranking of the two measures is added up and divided by two and then you get the freedom house ranking number, e.g.  $6+3=9$   $9/2=4.5$ . Then 4.5 falls into the category partly free, since 1-2.5 is free, 3-5.5 is partly free and 5.5-7 is not free. So the freedom house country ratings from 1-3 where 3 is less authoritarian.

I expect countries where people have higher authority will have higher growth.

### 5.3.5 dummy-variable for countries in the tropics

The reason for including a dummy for countries with tropical climate is that climate may influence growth due to its possible effect on productivity. In countries with tropical climate, tropical diseases, such as malaria and limitations on agricultural productivity is common and these are variables may influence growth. In addition numerous studies have found that tropical climate have a negative relationship with growth such as e.g. Gallup, Sachs and Mellinger, 1998. Therefore I expect that there will be a negative relationship between this dummy and growth. In order to assess the effect of aid on growth on countries in the tropics; I will include an interaction term between this dummy and aid. Here too I expect a negative relationship with growth.

### 5.3.6 dummy-variable for East Asia and Central America

A dummy variable for East Asia and Central America is also included in the regression analysis to see whether the simple location of a country can influence growth, or that countries in a certain part in the world has higher growth. Earlier research has been showing that simply the fact that a country is located in the Sub Saharan Africa has a negative effect on growth. Of course there must be a reason for this, but it has not yet been clarified. Also, there has been a high economic growth in the East Asian countries. I expect that countries situated in East Asia and Central America will have a positive relationship with growth and that this will show that Sub Saharan Africa do not have this positive relationship with growth.



## 6. Method

### 6.1 Introduction

In this chapter the method used to find out whether foreign aid influence growth will be presented and discussed.

### 6.2 Regression analysis

The empirical analysis is based on a regression analysis with cross-sectional data over 65 developing countries from 1970 to 1997. The reason for choosing the number of countries and this time-period is simply because of the data availability. With cross-sectional data, data are collected over sample units, in this case, countries, in a particular time period. I have chosen to use this data form since it is easy to conduct tests for e.g. heteroskedasticity and goodness of the model. Even though panel data allow you to account for differences both over time and between countries, which is good, it is much harder to test the “goodness” of the model.

Firstly, the values on the p-value and the adjusted R<sup>2</sup>-value will be analysed and discussed. The R<sup>2</sup>-value is a measure of the “goodness” of the model; I.e. how much the model can explain of the variation in growth between the developing countries. I will concentrate on analysing whether the values on the correlationcoefficients,  $\beta$ , is positive or negative and will not analyse the exact values since that is not what is important in a growth regression. Since the regression is estimated with the ordinary least squares method, some tests are needed in order to be sure that the model fulfils the underlying assumptions in the model. E.g. the residuals have to have constant variance and be normally distributed with mean 0 and standard deviation equal to  $\sigma^2$ .<sup>27</sup>

There are often problems with heteroskedasticity in cross-sectional data, i.e. when the variances of all observations are not the same, so for larger sets of observations,

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<sup>27</sup> The assumptions for OLS can be seen in appendix 7

there is more uncertainty associated with the outcomes in growth. Then the assumption of constant variance is violated. If ignoring heteroskedasticity and using incorrect standard errors you tend to overstate the precision of estimation i.e. we get confidence intervals that are narrower than they should be. In order to check for and correct for heteroskedasticity the White-test is used.

Endogeneity of aid is a problem that has been known and discussed for several decades. Therefore most aid effectiveness studies test for endogeneity of aid. Endogeneity means that there are biases in the estimated parameters since aid might be determined within the regression and is therefore not given or determined outside the regression. I.e. aid might be jointly determined by some other variable in the model like e.g. growth or policy. The least square estimator of parameter of an endogenous variable is biased and inconsistent because of correlation between the random error and the endogenous variable on the right-hand side of the equation. Aid should be treated as an endogenous variable in cross country studies since time-averages are employed and both aid and growth are jointly endogenous.<sup>28</sup> However since the software E-views 3.1 do not have the function to test for endogeneity I have to let this be. It has been discussed in later research how large problem the endogeneity in aid is in the growth regressions but there is no clear answer. We leave this subject behind but keep it in mind when analysing the results.

### 6.3 Empirical model

$$GR_i = \alpha + \beta_1 * aid_i + \beta_2 * aid2_i + \beta_3 * pol_i + \beta_4 * pol\_aid_i + \beta_5 * fh_i + \beta_6 * trop_i + \beta_7 * IGDP_i + \beta_8 * fh\_aid_i$$

GR: is growth as the change in growth of GDP

AID: is foreign aid

AID2: is foreign aid squared

POL: is policy index 1 or 2

POL\_AID: is policy index 1 or 2 multiplied with foreign aid

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<sup>28</sup> Dalgaard, Hansen and Tarp (2003) "On the Empirics of Foreign Aid and Growth"

FH: is freedom house index

TROP: is a dummy for the countries situated in the tropics

IGDP: is initial GDP

EAD: dummy for the countries situated in the East Asia

FH\_AID: freedom house index multiplied with foreign aid

In the following section the results and conclusions will be presented.

## 7. Empirical results and conclusions

### 7.1. Introduction

In this section the results and output from the regression analysis are presented. Further the results will be discussed and finally the paper will be concluded.

### 7.2 Analysis and result

In regression 1, I used the first policy index. The results are shown below.

#### Regression 1

| Dependent variable: GR    |                    |                |
|---------------------------|--------------------|----------------|
| Method: Least squares     |                    |                |
|                           | <b>coefficient</b> | <b>p-value</b> |
| <b>C</b>                  | 10.15320           | 0.0039         |
| <b>AID</b>                | 1.750840           | 0.1000         |
| <b>AID2</b>               | -0.030558          | 0.7839         |
| <b>POL</b>                | 0.679443           | 0.0420         |
| <b>POL*AID</b>            | -0.133663          | 0.4350         |
| <b>FH</b>                 | -0.444294          | 0.0795         |
| <b>FH*AID</b>             | -0.197066          | 0.1289         |
| <b>IGDP</b>               | -1.020352          | 0.0135         |
| <b>EAD</b>                | 2.222040           | 0.0054         |
| <b>CAD</b>                | -1.142841          | 0.1142         |
| <b>TROP*AID</b>           | -1.145656          | 0.0223         |
| <b>R-squared adjusted</b> | 0.562709           |                |

Here 56.3 percent of the variation in growth can be explained by the model. In this particular regression there is a linear positive relationship between aid and growth at the ten percent significance level. This could be interpreted as aid works in developing countries. However the relationship can also be the other way around, that countries with higher growth get more aid. Both alternatives are possible. In Dalgaard, Hansen and Tarp they found a non-linear relationship between aid and growth with decreasing returns. This was seen by the results from aid squared. However, in my regression there is no non-linear relationship between aid and growth. Looking at the policy index 1, there is a positive and significant linear

relationship with growth. However the interaction term between policy and aid are not significant, so there is no conclusion to be drawn at this point about the aid effectiveness in countries with “good” or “bad” policies.

The freedom house index and growth have a negative relationship, indicating lower growth in countries where people have less authority. The interaction term between the measure of institutional quality and aid are not significant so no conclusions about if aid works in countries with good institutional quality can be drawn.

The results are also pointing at conditional convergence between the developing nations, i.e. it seems as if there has been a catch-up process between these countries so that the countries with higher initial growth are growing slower than the countries with lower initial growth.

Furthermore the dummy variable for East Asian countries is clearly positive and significant pointing at a clear positive growth trends in these countries and indicating negative or lower growth trends in Sub Saharan Africa. The dummy for Central America is not significant therefore there is nothing pointing at higher growth in Central America than in Sub Saharan Africa.

Finally the interaction term between the dummy for countries situated in the tropics and aid are pointing at lower aid efficiency in the tropical countries.

The same regression but with policy index 2, instead of policy index 1, was performed to see whether the formulation of the policy index are influencing the final results in the growth regression. The results are following below:

**Regression 2:**

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Dependent variable: GR  
Method: Least squares

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|             | <b>coefficient</b> | <b>p-value</b> |
|-------------|--------------------|----------------|
| <b>C</b>    | 10.60042           | 0.0030         |
| <b>AID</b>  | 1.092572           | 0.3146         |
| <b>AID2</b> | 4.16E-05           | 0.9997         |
| <b>POL2</b> | 0.402305           | 0.3642         |

|                           |           |        |
|---------------------------|-----------|--------|
| <b>POL2*AID</b>           | 0.087117  | 0.7245 |
| <b>FH</b>                 | -0.328160 | 0.1947 |
| <b>FH*AID</b>             | -0.234972 | 0.0665 |
| <b>IGDP</b>               | -1.079019 | 0.0098 |
| <b>EAD</b>                | 2.452643  | 0.0029 |
| <b>CAD</b>                | -0.973269 | 0.1821 |
| <b>TROP*AID</b>           | -0.937750 | 0.0167 |
| <b>R-squared adjusted</b> | 0.543709  |        |

In regression 2, 54.4 percent of the variation in growth between countries can be explained by the model.

Here the results are different. There are no linear or non-linear relationship between aid and growth. The same goes for the policy index 2 as well as for the interaction term between policy index 2 and aid. However we can see that aid is more efficient in countries with better institutions or in countries where people have more authority.

Here too we can see conditional convergence between the developing countries. The dummy for countries situated in East Asia have a positive relationship with growth, pointing at that the simple fact that a country is situated in East Asia makes growth higher than in Sub Saharan Africa. Nothing can be said about Central America since the dummy variable is not significant. Furthermore aid is less efficient in countries with tropical climate than in other developing countries on average.

The only difference between regression 1 and 2 is that there were a positive linear relationship between aid and growth in regression 1 and in regression 2 aid worked better in countries with better institutional quality as measured by the freedom house index. However these differences are due to the construction of the policy index. The same variables are used in both indexes, still the outcome of the regression differ depending on which index is included.

I tested regression 1 and 2 for heteroskedasticity with a White-test where the null hypothesis is homoskedasticity. In appendix 5 the results are presented. The White-test is also a general test for model misspecification, since the null hypothesis underlying the test assumes that the errors are both homoskedastic and independent

of the regressors, and that the linear specification of the model is correct. Failure of any one of these conditions could lead to a significant test statistic. Conversely, a non-significant test statistic implies that none of the three conditions is violated. Since the p-value is 0.51 in regression 1 and 0.23 in regression 2, there are no problem with heteroskedasticity in the model.

I also tested the regressions for normality with the Jarque-Bera test<sup>29</sup>. The null hypothesis tested is normal distribution. The Jarque-Bera statistic is 2.715928 for regression 1 and the p-value is 0.257184 which means that we cannot reject the null hypothesis of normality at the 5 percent level. In regression 2 the Jarque-Bera statistic is 4.5 and the p-value is 0.105388 which means that here too we cannot reject the null of normality at the 5 percent level.

The interesting thing about these regressions is that with small changes the results can be different. In the following regressions there are some small changes made and the outcomes are in some cases different from the outcomes above. A summary of all the regressions follow below where the results that are significant on both 5 and 10 percent significance level will be in italique and bold text. For the interested reader the regressions in full form will be presented in appendix 6.

In regression 3 and 4, the interaction term between the dummy for countries situated in the tropics and foreign aid is replaced by the simple dummy for the tropics. With policy index 1 there are significant linear relationships between growth and freedom house index, the East Asian dummy, initial GDP and the tropics dummy. However nothing can actually be concluded about the aid efficiency. In regression 4 with policy index 2, there are some interesting results. In addition to the results in regression 3, the interaction term between policy and aid are significant and positive, indicating that aid works better in countries with “good” policies.

This was an interesting result since it shows how easy you can choose the combinations of variables and construction of variables in order to get interesting results.

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<sup>29</sup> The variables do not need to be normally distributed individually, what we test is if the variables or the errors together in the regression model are normally distributed.

Summary regression 1-8

|                 | R1                              | R2                              | R3                              | R4                              | R5                              | R6                              | R7                              | R8                              |
|-----------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| <b>AID</b>      | <b>1.7508</b><br><b>0.1000</b>  | 1.0926<br>0.3146                | 0.0068<br>0.9915                | -0.6331<br>0.3555               | 1.4018<br>0.2210                | 0.8667<br>0.4195                | 0.3761<br>0.5445                | -0.3808<br>0.5788               |
| <b>AID2</b>     | -0.0306<br>0.7839               | 0.0000<br>0.9997                | -0.0407<br>0.7261               | 0.0397<br>0.6995                | -0.0534<br>0.6422               | -0.0369<br>0.7345               | -0.0166<br>0.8865               | 0.0593<br>0.5632                |
| <b>POL</b>      | <b>0.6794</b><br><b>0.0420</b>  |                                 | 0.1776<br>0.5884                |                                 | 0.4971<br>0.2061                |                                 | 0.1046<br>0.7445                |                                 |
| <b>POL2</b>     |                                 | 0.4023<br>0.3642                |                                 | 0.0519<br>0.9039                |                                 | 0.2885<br>0.5121                |                                 | -0.0756<br>0.8565               |
| <b>POL*AID</b>  | -0.1337<br>0.4350               |                                 | 0.1896<br>0.1316                |                                 | -0.0439<br>0.8265               |                                 | <b>0.2204</b><br><b>0.0835</b>  |                                 |
| <b>POL2*AID</b> |                                 | 0.0871<br>0.7245                |                                 | <b>0.3442</b><br><b>0.0618</b>  |                                 | 0.1453<br>0.5545                |                                 | <b>0.4150</b><br><b>0.0687</b>  |
| <b>FH</b>       | <b>-0.4443</b><br><b>0.0795</b> | -0.3282<br>0.1947               | <b>-0.4779</b><br><b>0.0685</b> | <b>-0.4525</b><br><b>0.0911</b> | <b>-0.4826</b><br><b>0.0624</b> | <b>-0.4436</b><br><b>0.0892</b> |                                 |                                 |
| <b>FH*AID</b>   | -0.1971<br>0.1289               | <b>-0.2350</b><br><b>0.0665</b> | -0.1130<br>0.3774               | -0.1418<br>0.2665               | -0.1715<br>0.1977               | -0.1901<br>0.1377               | <b>-0.2427</b><br><b>0.0103</b> | <b>-0.2581</b><br><b>0.0066</b> |
| <b>IGDP</b>     | <b>-1.0204</b><br><b>0.0135</b> | <b>-1.0790</b><br><b>0.0098</b> | <b>-1.0310</b><br><b>0.0145</b> | <b>-1.1404</b><br><b>0.0073</b> | <b>-1.0535</b><br><b>0.0116</b> | <b>-1.1406</b><br><b>0.0060</b> | <b>-0.7885</b><br><b>0.0413</b> | <b>-0.8800</b><br><b>0.0241</b> |
| <b>EAD</b>      | <b>2.2220</b><br><b>0.0054</b>  | <b>2.4526</b><br><b>0.0029</b>  | <b>2.7758</b><br><b>0.0011</b>  | <b>2.7704</b><br><b>0.0011</b>  | <b>2.4613</b><br><b>0.0040</b>  | <b>2.6650</b><br><b>0.0013</b>  | <b>2.7132</b><br><b>0.0016</b>  | <b>2.7521</b><br><b>0.0014</b>  |
| <b>CAD</b>      | -1.1428<br>0.1142               | -0.9733<br>0.1821               | -0.5877<br>0.4117               | -0.5304<br>0.4646               | -0.9574<br>0.2042               | -0.7838<br>0.2786               | -0.3267<br>0.6494               | -0.2793<br>0.7002               |
| <b>TROP</b>     |                                 |                                 | <b>-1.2645</b><br><b>0.0509</b> | <b>-1.4026</b><br><b>0.0242</b> | -0.6475<br>0.3910               | -1.0004<br>0.1171               | -0.9489<br>0.1386               | <b>-1.0770</b><br><b>0.0734</b> |
| <b>TROP*AID</b> | <b>-1.1457</b><br><b>0.0223</b> | <b>-0.9378</b><br><b>0.0167</b> |                                 |                                 | -0.8635<br>0.1464               | <b>-0.7115</b><br><b>0.0793</b> |                                 |                                 |

In regression 5 and 6 both the dummy for the tropics and the interaction term between the dummy for countries situated in the tropics and aid is included in the regressions. For policy index 1 the results are the same as in regression 1 except for that there is no longer a significant linear relationship between aid and growth. For policy index 2 the significant interaction term between policy and aid in regression 5 loses its significance. The significant relationship between the freedom house index and aid in regression 2 also disappears.

In regression 7 and 8 the interaction term between tropics and aid is removed as well as the freedom house index. The differences in the outcome are remarkable. In regression 7 with policy index 1, aid works better in countries with good policies as well as in countries where people have more political rights and civil liberties. However the dummy for countries in the tropics are no longer significant.



In regression 8 with policy index 2, the results are the same as in regression 7, with the exception of the tropical dummy. Here there is again a negative linear relationship with growth.

### **7.3 Conclusion**

It can be concluded that the results on aid effectiveness is very sensitive to the estimation technique and the choice and construction of variables. Apparently there is no straight answer about aid effectiveness in the developing countries. It depends on which variables you believe are really correlated with growth, policy, tropical climate or institutions.

In regression 4, 7 and 8 the result was that aid works better in countries with good policies. However these results are sensitive to which variables are included in the regression. When including the tropical dummy in addition to the interaction term with aid, the interaction term between aid and policy loses its significance. When including only the tropical dummy as in regression 4 aid works better in countries with good policies but only when measuring policy with policy index 2. When excluding the interaction term between tropics and the freedom house index as in regression 7 and 8, aid works better in countries with good policies. So depending on the specification of the model the outcome differs a lot.

The results concerning aid effectiveness in tropical countries supports the findings of Dalgaard, Hansen and Tarp in regressions 1, 2, 5 and 6 where an interaction term between the dummy for tropical countries and aid is included. Aid works less well in countries with tropical climate. However this interaction term seems to drive out the significant results concerning aid effectiveness in countries with good policies and good institutions. This is also supported by the research made by Dalgaard, Hansen and Tarp.

Concerning the effects of aid on growth when taking into account institutional quality, measured by the freedom house index, the results are varying too. In

regression 2.7 and 8 aid works better in countries where people have higher authority, i.e. in countries where people have more political rights and civil liberties. However in regression 1,3,4,5 and 6, the interaction term between the freedom house index and foreign aid is insignificant. So nothing can be said about aid, institutional quality and growth in these regressions.

In all eight regressions conditional convergence between the developing nations has occurred. Also in all eight regressions the dummy for East Asian countries indicates higher growth in these countries and indicates that this is not the case in the Sub Saharan countries. The Central American dummy is not significant and therefore nothing can be said about the difference in growth between Central American countries and Sub Saharan countries.

It seems as if it is hard to come any further in this kind of research concerning foreign aid and growth, at least in the sense of growth regressions. Maybe it is time to fully concentrate on case studies on separate countries since the developing nations are differing so much and not continue to relying so much on econometric techniques and methods. After all, it seems strange that foreign aid do not have any linear or non-linear relationship with growth on the developing nations at all. All these resources must make some kind of use? Could it be that the uncertainty about how much, when and where foreign resources will be put in the recipient country that makes the effects of aid on growth, in a macroeconomic perspective, diffuse and vague? Because on a micro level, there are much more positive effects of foreign aid on growth documented.

Also the fact that aid is as hard as it is to measure, due to e.g. fungibility, must influence the results. When aid is tied to a specific project it is in fact fungible and it becomes extremely difficult to determine what exactly the aid has financed and hence what impact it has had on economic development. It was mentioned earlier that policy might be both a substitute and a complement to foreign aid. This is also a problem in the regression, since even though the policy index is significant; this simple fact can make its net effect insignificant. Furthermore we have the problem with causality which is hard to control for in cross-sectional data. We do not know

what spurs what. Does aid spurs growth in countries with better policies or do countries with higher growth get better policies and more aid?

And what more can be said with these techniques? We already know that aid works better in some countries than in others, but how should this information be used? Should all aid be directed to the countries where aid works and should the financial support towards countries with “inappropriate” policies, institutions or climate stop? Apparently, this is what has happened in the last decade more or less. More aid has been directed to countries with better policies as measured by inflation, trade openness and budget balance. And this is decisions based on the results of the econometric research made by Dollar and Burnside. What if these results are too heavily depended on the data? At least it seems to be too sensitive to the choice of data according to later research.

The weak macroeconomic structure in the developing nations contributes a lot to the fact that the developing nations do not follow the same pattern in economic development as the developed nations. This can be a problem since this kind of empirical research are built and developed to explain the growth in developed nations. The regressions are made for explaining the variation in growth in countries that are in the same growth path. In developing nations all countries are too different and far from being in the same growth path.

There is also another drawback with these kinds of growth regressions. Growth is a long-term phenomenon and to get a truly fair picture of the development of economic growth, data for much more years would be necessary. Data over at least a hundred years would be ultimate but this is apparently impossible since there is no data for such many years and especially not for the developing nations.

It is important to mention that one of the reasons to why it is hard to solve the problems existing in the developing countries today is amongst other things the lack of information and knowledge amongst economists about how to solve problems in the developing countries. There are people comparing the developing countries situation with the situation in which the developed countries were in before the

industrialisation but this is not good. There are too many fundamental differences between these two groups of countries.

If I had access to all the data I wanted for as many years as I wanted, and if there were no problems of measuring aid or problems with aid donation and reception, there are no doubts in my mind that foreign aid would have a clear positive trend on growth in the developing nations.

The final statement of this report is an invitation not to make it as easy as to listen to one report about aid effectiveness just because the results are convenient. I believe that more effort should be put on case studies in order to find out what works best in each individual country. Additionally something has to be done about the problems with foreign aid such as e.g. the aid dependency and the donor coordination in order to improve the effects of aid and the situation of millions of people in the developing world.

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## Appendix 1

Countries included in the analysis:

|               |             |                  |                     |
|---------------|-------------|------------------|---------------------|
| Argentina     | Egypt       | Sri Lanka        | Paraguay            |
| Burkina Faso  | Ethiopia    | Morocco          | Romania             |
| Bulgaria      | Gabon       | Madagascar       | Senegal             |
| Bolivia       | Ghana       | Mexico           | Sierra Leone        |
| Brazil        | Gambia, The | Mali             | El Salvador         |
| Botswana      | Guatemala   | Myanmar          | Syria               |
| Chile         | Honduras    | Malawi           | Togo                |
| China         | Haiti       | Malaysia         | Thailand            |
| Côte d'Ivoire | Hungary     | Niger            | Trinidad and Tobago |
| Cameroon      | Indonesia   | Nigeria          | Tunisia             |
| Congo, Rep.   | India       | Nicaragua        | Turkey              |
| Colombia      | Iran        | Pakistan         | Uganda              |
| Costa Rica    | Jamaica     | Peru             | Uruguay             |
| Dominican Rep | Jordan      | Philippines      | Venezuela           |
| Algeria       | Kenya       | Papua New Guinea | Congo Dem. Rep.     |
| Ecuador       | Korea       | Poland           | Zambia              |

Zimbabwe

## Appendix 2

The Sachs-Warner variable is based principally on five components. When a country is rated “closed” on any one of the components, it is rated closed overall. Now follow a description of the five components. and how they were updated for countries in the present study.

1. Black market premium larger than 20 percent. Global Development Network database for all years except 1994-95; black market exchange rate for 1994-95 from ICA, various editions; CDI, various editions; official exchange rate from IMF 2002. Algeria, Haiti, Iran, Myanmar, Nigeria, Syria rated closed through 1998. Ethiopia rated closed 1993–96. Kenya and Uganda rated closed 1993–94. Zambia rated closed 1993 and 1998.
2. Export marketing: “closed” if government has a purchasing monopoly on a major export crop and delinks purchase prices from international prices. Sub-Saharan Africa only. Based on late-1992 status from World Bank 1994, p. 239, and on late-1990’s IMF country reports. Absence of evidence in IMF documents of such intervention is interpreted as evidence of absence. Cameroon and Republic of Congo rated open 1993–98. Madagascar rated open 1997–98. All other countries in present study unchanged since 1992.
3. Socialism. Based on CIA 2002. Republic of Congo rated non-socialist 1991–97 but socialist in 1998. Ethiopia rated non-socialist 1992–98. Nicaragua rated non-socialist for 1991–98. All other countries in study unchanged since 1992.

4. Own-imported-weighted average frequency of non-tariff measures (licenses, prohibitions, and quotas) on capital goods and intermediates > 0.4. Single estimates for late 1990's derived from UNCTAD 2001. Data year for imports: 1999. Data year for non-tariff measures: varies by country, between 1992 and 2000, mostly late 1990's. Only Argentina, Bangladesh, China, and India rated closed.
5. Own-imported-weighted average tariff on capital goods and intermediates > 0.4. Single estimates for late 1990's derived from UNCTAD 2001. Only Pakistan rated closed.

### Appendix 3

#### Sensitivity analysis on policy index 1

##### 1. Changing budget balance by 10 percent

| GR=C(1)+C(2)*BB10+C(3)*M2_GDP01+C(4)*LOGBLACK |             |            |             |        |
|---|-------------|------------|-------------|--------|
|   | Coefficient | Std. Error | t-Statistic | Prob.  |
| C(1)  | 1.655799    | 0.664257   | 2.492707    | 0.0154 |
| C(2)  | 0.312699    | 0.091809   | 3.405959    | 0.0012 |
| C(3)  | 0.057723    | 0.016182   | 3.567175    | 0.0007 |
| C(4)  | -0.572916   | 0.275883   | -2.076662   | 0.0421 |

##### 2. Changing financial depth by 10 percent

| GR=C(1)+C(2)*BB+C(3)*M210+C(4)*LOGBLACK |             |            |             |        |
|---|-------------|------------|-------------|--------|
|   | Coefficient | Std. Error | t-Statistic | Prob.  |
| C(1)                                    | 1.655799    | 0.664257   | 2.492707    | 0.0154 |
| C(2)                                    | 0.281429    | 0.082628   | 3.405959    | 0.0012 |
| C(3)                                    | 0.064137    | 0.017980   | 3.567175    | 0.0007 |
| C(4)                                    | -0.572916   | 0.275883   | -2.076662   | 0.0421 |

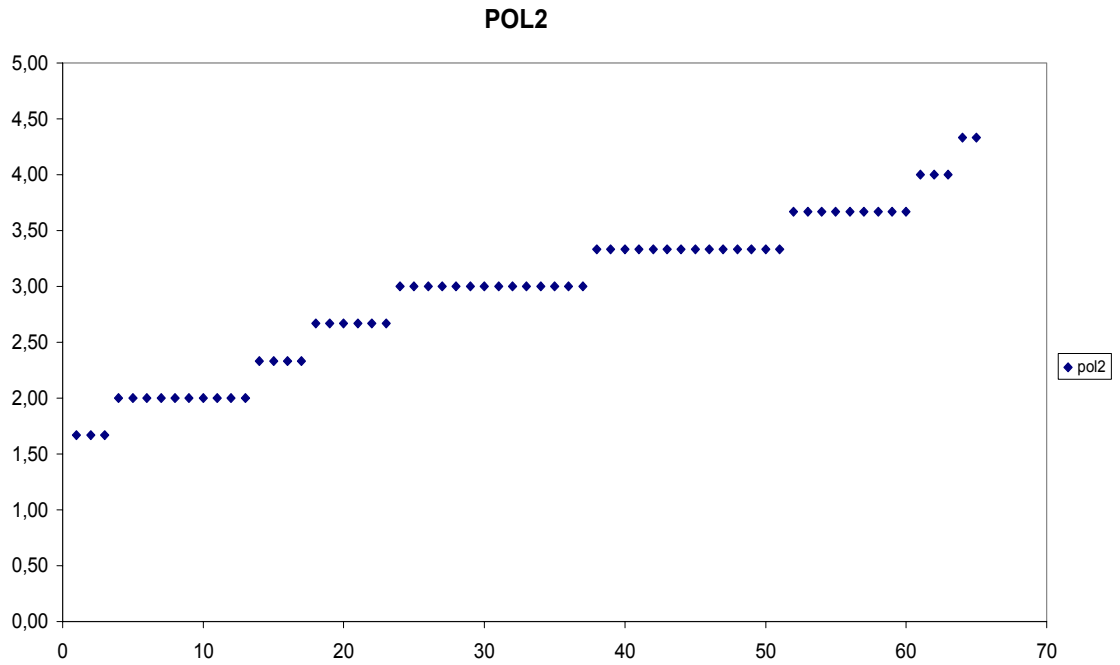
##### 3. Changing black market premium by 10 percent

| GR=C(1)+C(2)*BB+C(3)*M2_GDP01+C(4)*BLMAR10 |             |            |             |        |
|--|-------------|------------|-------------|--------|
|  | Coefficient | Std. Error | t-Statistic | Prob.  |
| C(1)                                       | 1.655799    | 0.664257   | 2.492707    | 0.0154 |
| C(2)                                       | 0.281429    | 0.082628   | 3.405959    | 0.0012 |
| C(3)                                       | 0.057723    | 0.016182   | 3.567175    | 0.0007 |
| C(4)                                       | -0.636573   | 0.306537   | -2.076662   | 0.0421 |



## Appendix 4

Plot of policy index 2:



## Appendix 5

Heteroskedasticity test regression 1:

---

| White Heteroskedasticity Test: |          |             |          |
|--------------------------------|----------|-------------|----------|
| F-statistic                    | 0.974356 | Probability | 0.505650 |
| Obs*R-squared                  | 17.03444 | Probability | 0.452035 |

---

Heteroskedasticity test regression 2:

---

| White Heteroskedasticity Test: |          |             |          |
|--------------------------------|----------|-------------|----------|
| F-statistic                    | 1.341886 | Probability | 0.226598 |
| Obs*R-squared                  | 20.87985 | Probability | 0.231711 |

---

## Appendix 6

Alternative regressions

### Regression 3

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Dependent variable: GR  
Method: Least squares

---

|                | <b>coefficient</b> | <b>p-value</b> |
|----------------|--------------------|----------------|
| <b>C</b>       | 11.88539           | 0.0017         |
| <b>AID</b>     | 0.006760           | 0.9915         |
| <b>AID2</b>    | -0.040721          | 0.7261         |
| <b>POL</b>     | 0.177626           | 0.5884         |
| <b>POL*AID</b> | 0.189609           | 0.1316         |
| <b>FH</b>      | -0.477874          | 0.0685         |
| <b>FH*AID</b>  | -0.113001          | 0.3774         |
| <b>IGDP</b>    | -1.030985          | 0.0145         |
| <b>EAD</b>     | 2.775823           | 0.0011         |
| <b>CAD</b>     | -0.587664          | 0.4117         |
| <b>TROP</b>    | -1.264456          | 0.0509         |

---

|                           |          |
|---------------------------|----------|
| <b>R-squared adjusted</b> | 0.547242 |
|---------------------------|----------|

---

### Regression 4:

---

Dependent variable: GR  
Method: Least squares

---

|                 | <b>coefficient</b> | <b>p-value</b> |
|-----------------|--------------------|----------------|
| <b>C</b>        | 13.03906           | 0.0006         |
| <b>AID</b>      | -0.633139          | 0.3555         |
| <b>AID2</b>     | 0.039664           | 0.6995         |
| <b>POL2</b>     | 0.051861           | 0.9039         |
| <b>POL2*AID</b> | 0.344222           | 0.0618         |
| <b>FH</b>       | -0.452460          | 0.0911         |
| <b>FH*AID</b>   | -0.141847          | 0.2665         |
| <b>IGDP</b>     | -1.140433          | 0.0073         |
| <b>EAD</b>      | 2.770396           | 0.0011         |
| <b>CAD</b>      | -0.530367          | 0.4646         |
| <b>TROP</b>     | -1.402563          | 0.0242         |

---

|                           |          |
|---------------------------|----------|
| <b>R-squared adjusted</b> | 0.536450 |
|---------------------------|----------|

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### Regression 5

---

Dependent variable: GR  
Method: Least squares

---

|             | <b>coefficient</b> | <b>p-value</b> |
|-------------|--------------------|----------------|
| <b>C</b>    | 11.16744           | 0.0030         |
| <b>AID</b>  | 1.401758           | 0.2210         |
| <b>AID2</b> | -0.053432          | 0.6422         |
| <b>POL</b>  | 0.497069           | 0.2061         |

|                           |                 |        |
|---------------------------|-----------------|--------|
| POL*AID                   | -0.043921       | 0.8265 |
| FH                        | -0.482581       | 0.0624 |
| FH*AID                    | -0.171516       | 0.1977 |
| IGDP                      | -1.053513       | 0.0116 |
| EAD                       | 2.461342        | 0.0040 |
| CAD                       | -0.957372       | 0.2042 |
| TROP                      | -0.647476       | 0.3910 |
| TROP*AID                  | -0.863538       | 0.1464 |
| <b>R-squared adjusted</b> | <b>0.560048</b> |        |

### Regression 6

Dependent variable: GR

Method: Least squares

|                           | <b>coefficient</b> | <b>p-value</b> |
|---------------------------|--------------------|----------------|
| C                         | 12.19984           | 0.0010         |
| AID                       | 0.866724           | 0.4195         |
| AID2                      | -0.036909          | 0.7345         |
| POL2                      | 0.288515           | 0.5121         |
| POL2*AID                  | 0.145252           | 0.5545         |
| FH                        | -0.443592          | 0.0892         |
| FH*AID                    | -0.190100          | 0.1377         |
| IGDP                      | -1.140614          | 0.0060         |
| EAD                       | 2.664963           | 0.0013         |
| CAD                       | -0.783790          | 0.2786         |
| TROP                      | -1.000353          | 0.1171         |
| TROP*AID                  | -0.711450          | 0.0793         |
| <b>R-squared adjusted</b> | <b>0.560483</b>    |                |

### Regression 7:

Dependent variable: GR

Method: Least squares

|                           | <b>coefficient</b> | <b>p-value</b> |
|---------------------------|--------------------|----------------|
| C                         | 8.074323           | 0.0117         |
| AID                       | 0.376121           | 0.5445         |
| AID2                      | -0.016608          | 0.8865         |
| POL                       | 0.104644           | 0.7445         |
| POL*AID                   | 0.220375           | 0.0835         |
| FH*AID                    | -0.242690          | 0.0103         |
| IGDP                      | -0.788522          | 0.0413         |
| EAD                       | 2.713192           | 0.0016         |
| CAD                       | -0.326747          | 0.6494         |
| TROP                      | -0.948946          | 0.1386         |
| <b>R-squared adjusted</b> | <b>0.510762</b>    |                |

### Regression 8:

Dependent variable: GR

Method: Least squares

|                           | <b>coefficient</b> | <b>p-value</b> |
|---------------------------|--------------------|----------------|
| <b>C</b>                  | 9.294164           | 0.0038         |
| <b>AID</b>                | -0.380842          | 0.5788         |
| <b>AID2</b>               | 0.059292           | 0.5632         |
| <b>POL2</b>               | -0.075591          | 0.8565         |
| <b>POL2*AID</b>           | 0.415048           | 0.0687         |
| <b>FH*AID</b>             | -0.258127          | 0.0066         |
| <b>IGDP</b>               | -0.879950          | 0.0241         |
| <b>EAD</b>                | 2.752136           | 0.0014         |
| <b>CAD</b>                | -0.279330          | 0.7002         |
| <b>TROP</b>               | -1.077035          | 0.0734         |
| <b>R-squared adjusted</b> | 0.502676           |                |

## Appendix 7

Underlying assumptions for an OLS regression:

1.  $E(e_i) = 0$  for all  $i$ , i.e. that there is no systematic error
2.  $E(e_i^2) = \sigma^2$  for all  $i$ , i.e. that there is constant variance, homoskedasticity
3.  $E(e_i e_s) = 0$  for all  $i, i = s$ , no autocorrelation (time-series data)
4.  $e_i \sim N(0, \sigma^2)$ , the error terms are normally distributed
5.  $x_i$  is exogenous