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Trade Openness and Economic Growth

Do Institutions Matter ?

Kyrre Stensnes

[Abstract] Do lower policy-induced barriers to international trade promote economic growth in countries with poorly developed institutions? Several studies have found a general and positive relationship between trade openness and growth on average, but many of them are marred by methodological shortcomings and considerable unexplained variation in the results. I propose that good institutions of conflict management are a contingent and mediating factor that can help to explain data heterogeneity. Without such institutions, countries that integrate with world markets become vulnerable to external shocks, possibly unleashing domestic conflicts and uncertainty detrimental to growth. This hypothesis is given empirical support by analysing an interaction variable between openness and institutions, integrated in a growth regression for a sample of 94 countries. The interaction variable is positive, significant and robust to a standard list of control variables. For countries with the least developed institutions of conflict management, greater openness is ceteris paribus found to reduce growth rates. The results reveal the inadequacies of a 'one size fits all' approach to trade liberalisation, and indicate that complementary institutional reforms may be necessary if a country is to reap the full growth effects of openness.

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'If we can learn about government policy options that have even small effects on the long-term growth rate, then we can contribute more to improvements in standards of living than has been provided by the entire history of macroeconomic analysis […]. Economic growth […] is the part of macroeconomics that really matters.'

Barro and Sala-i-Martin (1995:5)

1. Introduction

Few questions in economics have been more passionately debated than the relationships between trade policy and economic development. Ever since Ricardo launched his theory of comparative advantages to fight the English Corn Laws, economists have been advocating the advantages of free trade with now-familiar arguments: Openness promotes the efficient allocation of resources through specialisation and comparative advantage; it promotes competition in national and international markets, and allows for easier diffusion of knowledge and technology across countries. Traditional trade theories in economics employ a *static* framework in the sense that the resources and technology employed in production are exogenous to the models. Free trade is then seen to promote efficiency through the division of labour and redistribution of productive activity across countries, thereby moving the world economy towards the international production possibility frontier. As such, a static framework predicts that freer trade will increase the *level* of income.

The next question then becomes how freer trade will affect long-term rates of economic *growth*. This issue is certainly more complex, and may in one sense be more important: Think of a situation where the *static* income effect from trade liberalisation is low compared to the *dynamic* income effect though a change in long-term growth rates. This may very well be the case, implying that policy advice should be based on how trade openness influences income *growth* rather than the income *level*. Standard static trade theory generally predicts that trade policy as such has no effect on steady-state growth rates of output (Rodrik and Rodriguez, 2001: 8). More recent theories based on endogenous growth propose that the relationship is ambiguous (Grossman and Helpman, 1991). If specialisation promoted by trade channels domestic resources to a sector that enjoys increasing returns to scale, growth may be enhanced. But a technologically backward country may risk specialising in non-dynamic industries and lose out on these benefits, experiencing adverse effects on growth. Economic theory does not offer clear predictions, and ultimately the relationship between openness and growth remains an empirical question.

Several empirical contributions[1] have addressed this relationship. Most of them find a positive relationship between openness and growth, and a scholarly consensus seemed to be emerging. This consensus was

[1] Among the more important are Sachs and Warner (1995), Edwards (1998), Frankel and Romer (1999), Rodrik and Rodriguez (2001), Wacziarg and Welch (2003), and Noguer and Siscart (2005).

challenged in an important contribution by Rodrik and Rodriguez (2001), who argue that the relationship evaporates when one corrects for methodical shortcomings in the literature. All studies acknowledge that econometric challenges are persistent in the cross-national regressions employed to examine the question: measurement problems, endogenous variables and omitted variable bias are endemic to theseregression specifications in general. This is especially true of the indicators employed for openness, and much of the literature is concerned with how outward trade policy orientation best can be measured. Although most studies end up concluding that trade tends to foster growth on average, there is considerable unexplained heterogeneity in the data. All in all, a clear and robust relationship has yet to be established.

This paper starts with the observation that the unexplained heterogeneity in the empirical literature might be better understood by looking at *contingent* relationships between openness and growth. The success of outwards orientation in terms of growth performance may depend on certain characteristics that enable countries to adjust to the situation introduced by international competition. Such a possibility can be linked to the general theory of the second best, as set forth by Lipsey and Lancaster (1956): Implementing free trade may not be an optimal response when imperfections exist in other markets or institutions. Chang, Kaltini, and Loayza (2005) investigate, for instance, how labour market distortions must be addressed to reap the full benefits of international trade, but they also suggest that an interaction between openness and other variables is important in shaping outcomes.

The proposition I advance is that the level of institutional development determines how countries respond to the situation imposed by international competition. Specifically, if an economy is unable to deal adequately with the external shocks that come with integration into world markets, growth can collapse. This argument will be developed in three steps. First, a model framework developed by Rodrik (1999a) shows how domestic institutions of conflict management[2] are needed to respond properly to external shocks. If conflict management capacity is weak, groups within society have strong incentives to start a costly fight to acquire a disproportionate share of resources. Once conflict is unleashed, the costs multiply and the economy may become gridlocked in uncertainty. Second, an extension model based on Rodrik (1991) is developed to illustrate the costs of such uncertainty. It shows that even a 10% chance that government will not be able to respond properly to an external shock, may under certain assumptions give an implicit expected tax of 44% on investments – investments that often are seen as a key to unleashing growth. Third, to make these results relevant to the interaction between openness and institutions, I assume that open economies are more exposed to external risk. This assumption is discussed on theoretical grounds, and supported by empirical

2 For instance democracy, a competent bureaucracy, an honest legal system, and institutionalized forms of social insurance can contribute toward conflict management institutions that by definition 'adjudicate distributional contents with a framework of rules and accepted procedures' (Rodrik, 1999a: 386).

evidence that is presented. Rodrik (1999b: 40) sums up the argument as follows:

> Openness will leave countries vulnerable to external shocks that can trigger domestic social conflicts and political upheavals. These consequences are damaging not only in their own right, but also serve to prolong and magnify the effects of external shocks. […] Therefore, the ability to manage turbulence in the world economy is a critical component of a strategy of making openness work.

The purpose of this paper is twofold. First, I wish to place the proposition I advance in a larger context and provide a brief survey of the relevant empirical literature on the effects of both trade openness and institutions on growth. Second, I want to test empirically the working hypothesis I propose: that the effect of openness on growth is greater when a country has well developed institutions of conflict management. Specifically, this implies that the interaction variable between openness and institutions is positive, statistically significant and robust to the inclusion of relevant control variables.

An empirical analysis is undertaken using historical growth rates in the period from 1975 to 2000 for a sample of 94 countries.[3] Selected components of the International Country Risk Guide from Political Risk Services (2005) are used as an indicator of institutional conflict management capacity, and average unweighted tariff rates are employed as a variable for openness. The analysis shows that the interaction variable between openness and institutions is positive, significant and robust to the inclusion of the control variables investments, a human capital measure and pre-period GDP to correct for convergence. When the interaction variable is included, the openness variable becomes negative. Taken literally, this indicates that countries with poorly developed institutions may actually experience lower levels of growth from the integration into world markets. The openness variable is robust to the same list of controls.

The results therefore appear to lend support to the hypothesis that good institutions of conflict management are necessary to reap the full growth benefits of openness. Nevertheless, some reservations should be made. First, trade reforms are usually accompanied by other reforms and are rarely carried out in a *ceteris paribus* setting. If care is taken to implement complementary policies, trade reform can be used as a vehicle for institutional reform. Second, the results presented might be more robust if multiple measures of openness and institutions could have been included in the analysis. Good alternative approaches were not readily available for me within the scope of this paper, so robustness checks with alternative indicators must be left to future research. Third, finding an interaction effect between openness and institutions is not the same as determining the *exact channel* of the interplay between the two variables. The web of causality is complex, and the empirical analysis here does not give grounds for excluding the possibility that the interaction effect has a different origin.

[3] Regressions are done with Stata 7.0.

These reservations not withstanding, the results *do* show that trade policies work differently in different institutional settings. That could serve as a warning against the idea that trade liberalisation is a universal policy recommendation for growth: the same medicine may not do all patients equally good. Furthermore, the findings can provide some indication that, for countries with weak institutions of conflict management, trade liberalisation per se may not be the most important contribution to a development strategy. As such, the analysis points to some important areas that policymakers should focus on. However, more research on institutional arrangements is needed before exact policy recommendations can be made.

The structure of this paper is as follows: Chapter 2 gives some background and context to the topic. Recent trends in development economics and development practice are presented, and some clarifications are made. Chapter 3 offers an introduction to trade theory and its predictions on the growth effects of freer trade. Chapter 4 surveys the empirical literature on the relationship between trade openness and growth. Chapter 5 integrates the institutional aspect, conceptual issues are presented, and I briefly survey the literature on how institutions affect growth. Chapter 6 proposes a theory for why conflict management is important for making openness work. Chapter 7 presents the empirical analysis, and conclusions are summarised in Chapter 8.

'Once one starts to think about the [questions raised by development economics], it is hard to think about anything else.'

Lucas (1998: 5)

2. Trade and development – an overview

This paper deals with the impact of economic openness on growth in general, and in particular how the growth effects of trade are influenced by the institutional capacity to manage conflicts. The purpose of this particular chapter is twofold. First, I wish to place the topic within a broader development perspective and indicate how it relates to other research and policy controversies.[4] Second, I clarify some issues and concepts that are important to the core chapters that follow.

2.1 Trends in development economics

Theories of economic growth are closely related to development and development economics. In fact, both terms have common origins in experiences of the early post-Second War World era. Decolonisation meant that most of the countries that until then had been seen as 'backward' gained political independence, and a movement to advance their economies was set into motion. The new term less developed country was coined to indicate 'a country with less advanced technology and/or lower income levels than the advanced industrial countries' (Black, 2002, unpaged). Being a less developed country is certainly a matter of degree, and several further characteristics can arguably be incorporated into the definition. Still, it is clear that technological advancement and income levels are the key elements that differentiate a less developed country from an industrialised nation.[5]

An understanding of the forces of development was necessary to meet the policy needs of these emerging nations. Development economics built on both classical and neoclassical foundations, and sought to act as the intellectual counterpart to the new political order.[6] The discipline was

[4] Trade and development are both complex and sizeable topics, and it follows from the nature of an overview that many of the tangent issues will be presented in a peripheral and superficial way. This paper attempts to address only a few of the questions raised.

[5] LDCs and industrialised states are commonly denoted developing and developed countries, respectively. These convenient short forms will be applied in this paper, but they can be misleading in at least two ways. First, the distinction between developing and developed seems to indicate that advancement and progress in industrial nations have come to a halt. Second, the terms may have connotation of non-neutral, outmoded colonial dichotomies between the 'civilised' and 'uncivilised' world. These misinterpretations should in no way be inferred from my usage of the terms developing and developed. Despite all their shortcomings, the terms capture an essential feature of development: the advancement of one nation can be evaluated only relative to that of others.

[6] Meier and Rauch (2000: 69–74) present a good historical summary of development economics. I follow them in dividing the discipline history into three distinct phases.

analytical and policy-oriented, aimed at determining how national strategies together with international measures could be better adopted to accelerate a country's development. Up until the mid-1960s, development was understood as being synonymous with increasing income per capita. Market failures were viewed as particularly pervasive in developing countries. State planning combined with policies for import substitution and industrialisation were considered to be important steps on the path to prosperity, whereas continued export of primary products was seen as a trap that locked developing nations into poverty. Theories of coordination failure were used as an economic rationale for governments to support and own industry. For instance, in the big push theory, set forth by Rosenstein-Rodan (1943) and later formalised by Murphy, Schleifer and Vishny (1989), a particular market externality implies that a certain fraction of the economy must industrialise before it becomes profitable for each individual entrepreneur to bear the fixed costs associated with industrial production. Without government intervention, the economy will not get the big push in growth that industrialisation is assumed to provide.

In the late 1960s and the early 1970s came a second phase of development economics that questioned the postulated equality between development and per capita income: Does growth automatically translate into better incomes for all members of society? Increased emphasis on poverty and inequality gave new dimensions to the development perspective. The focus shifted somewhat from industrialisation to rural development, from physical to human capital. But the major change in development economics took place in the 1970s and 1980s, a period marked by the revival of neoclassical economics. The focus shifted from market failures to the policy-induced distortions caused by state interventions. 'Getting prices right' became a slogan for the new view that market-based outcomes would normally give the best prerequisites for development. The state was now to concentrate on stabilising the economic environment and assume a more passive role. Outward-oriented policies and trade liberalisation replaced import substitution as the leading policy recommendation.

With the increased application of rationality-based economic models, development economics is reintegrating with other economic disciplines. Very roughly, we can discern an evolution where neoclassical economics had previously been considered a special case relevant for developed countries only. Now, development economics became the special case of neoclassical economics applied in a development setting (Meier and Rauch, 2000: 71). Although few would conclude that the discipline has lost its *raison d'être*, these changes led Hirschman (1981) to write an essay with the telling title 'The rise and fall of development economics'. Huge global income differences – the question of why some countries produce so much more output per worker than others, as Hall and Jones (1999) phrase it – is nevertheless still a research area where many economic questions remain unanswered.

Improved knowledge and better policies in this area could have massive welfare implications. In more modern research, the structural focus characteristic of dependency theory tends to be replaced by studies that explain the heterogeneity within the developing world. There has also been a

more recent trend toward increased emphasis on institutional factors, as can be seen for instance in a renowned study by Acemoglu, Johnson and Robinson (2001).

Questions related to economic openness and trade have been central to all phases of development economics. As such, there are several excellent contributions that are relevant to this paper. My particular approach to the topic, employing cross-national regressions and focusing on institutional parameters, is most related to the recent research contributions that will be presented in Chapter 4.

2.2 Trends in development practice

Summarizing how development policies have been practised in the post-war era is a daunting task, and I will limit myself to a few observations. Development economics has since its beginning sought to be policy-oriented, so it should come as no surprise that theory and development practice have moved along similar lines historically.

During the Cold War, many developing countries sought non-alignment, endeavouring to follow an independent line of development in politic and economics as well. Many states practised import substitution for a number of industrial products and took an active part in planning economic and industrial policies. Although development economists recommended some of these policies, ideological support was also important.

The post-ar period was a golden era for economic growth in the developing world. A major turning point came with the oil and debt crises that arose in the 1970s. The worldwide economic crisis marked by stagflation fuelled doubts about the effectiveness of interventionist strategies, and paved the way for a more neoclassical policy paradigm. At the same time, substantial oil revenues were being channelled to the developing world in the form of loans. Development optimism turned sour as international interest rates rose, export commodity prices fell, and the cost of US dollar-denominated loans rose with the appreciation of the dollar. When Mexico defaulted on its portfolio in 1982 and others soon followed, the debt crisis was officially proclaimed. For many of these countries, international financial institutions (IFIs) like the World Bank and the IMF were lenders of last resort, and became increasingly involved in managing the crisis (Killick, 1998).

From the early 1980s, especially the IMF took on a new role as gatekeeper of the loans and investments on which many developing countries depended (Stiglitz, 2002). To ensure the soundness of existing projects, the IMF required debtor countries to adopt an ambitious agenda for economic reform. The policy paradigm adopted is commonly labelled the ’Washington consensus‘ and includes fiscal discipline, price stability, privatisation as well as liberalisation of trade, investments and capital movements (Williamson, 2000: 252). The approach is based on free markets and global economic integration as a key to growth and prosperity – a view supported by many development economists. A more recent policy trend has put emphasis on governance reforms that aim to improve and strengthen quality of judicial, regulatory, monetary, and fiscal institutions. Based on the

idea that policy changes need strong institutional foundation to be effective, the new approach is often labelled second-generation reforms (Rodrik, 2004: 2).

Several countries did not agree to conditionality programmes with the IFIs, and many of those who did still have a long way to go before they become showcase models of the policies advocated by the Washington consensus. Current development strategies vary greatly in nature and scope. Nevertheless, it generally acknowledged that the Washington consensus and the IFIs have influenced both local policies and global thinking on development (Williamson, 2000; Killick, 1998).

2.3 Some controversies in trade policy

'Trade not aid' has long been a slogan for how the rich world should relate to developing countries, embraced by various economists and development practitioners all along the political scale. Although there is strong consensus in the development community that trade has a role in lifting the world population out of poverty, there is disagreement on the extent, method and timing of this interaction with world markets. A question that permeates the debate is the following: Should full trade liberalisation be undertaken on the basis of present advantages that developing countries have in primarily agriculture and textiles, or should national trade policy have a role in directing domestic resources to industrial sectors where the growth and development potential is higher?

Proponents of import substitution have obviously believed in the benefits of industrialisation, and in promoting it through trade policy measures. In recent decades, however, a pro-market, pro-trade movement has dominated development economics and development practice. A good example of this evolution is the much-cited paper by Sachs and Warner (1995), where the authors seek to document some common trends in world economic development after 1975. Trade liberalisation with economic openness is seen as the benchmark for the ongoing global integration of developing countries. Sachs and Warner argue that only developing countries that are integrated into the global economy will manage to catch up with the income levels of industrialised nations.

Scholars also disagree about the universality of policy recommendations. On the one hand, some make a universal case for trade liberalisation, arguing that all countries in all situations will reap a net benefit from freer trade. Others argue that trade policy will increase income if it can be integrated in a broader policy mix. Still others advocate a country-specific approach, where policies should depend on the economic context. In practice, trade reform is often characterised by gradualism, so economic agents are given time to adjust to the new prices (Melchior, 2005: 27). Trade also tends to be one of several aspects encompassed in a larger reform programme (Wacziarg and Welch, 2003). One topic of current interest due to the Doha development round in the WTO is the degree of policy space to be given to national governments, as opposed to trade-related policies being determined in international forums.

Since trade policy is assumed to affect economic growth, it is generally considered an integral part of a national development strategy. However, some scholars have questioned the strong emphasis placed on trade policy in recent years. Rodrik and Rodriguez (2001) are main proponents on this concern. Although they do not see trade policy as unimportant, they worry that the opportunity cost of research and policy development on trade is too high: a focus on trade may crowd out reforms and replace an overall development strategy that might have potentially higher growth effects.

Fully addressing these controversies is beyond the scope of this paper, even though the subject matter here is related to most of them. My focus will first of all be on discussing the empirical growth effect of trade. Questions related to institutions and policies that are complementary to openness will be addressed, but only to the extent that they are relevant for my main proposition about how openness and institutions of conflict management interact.

2.4 Important clarifications

Before proceeding further, I need to clarify how the term openness is employed. Also, I briefly discuss how economic growth affects poverty and inequality. The latter discussion is not directly related to the main hypothesis, but intended to illustrate an important and related message: Even though growth is usually seen as an important means to poverty reduction, the two variables are neither linearly nor unconditionally related.

2.4.1 Definition of openness

Large countries tend to trade less than small ones. States located far from large markets usually experience lower export shares. Geography, population, culture, and trade policy are only some of the factors that determine the trade volume of a given country – usually measured by the trade share to GDP. In many ways it would be correct to follow Pritchett (1996: 309) in defining openness ‘simply as an economy’s trade intensity‘. However, as will be discussed later in the review of literature on trade and growth, this definition would capture the trade that is induced by factors completely unrelated to trade *policy*. But our focus here is on how government through political strategy can influence trade and growth, and that requires examining the effects of trade policies rather than trade volumes. It would therefore be more accurate to define openness in relation to barriers to international trade imposed by government authorities. These are not limited to tariffs, quotas and non-tariff barriers (NTBs), but can take many forms. This theoretical definition is in line with several research studies, including Sachs and Warner (1995), Rodrik and Rodriguez (2001) and Wacziarg and Welch (2003). How the concept is operationalised is an integral part of the debate on openness and growth. For a discussion of specific openness measures, the reader is referred to later chapters in this paper.

2.4.2 Economic growth and poverty

Then to economic growth. A development strategy captures the notion of policies implemented intentionally to improve welfare in a country. Economic growth (and thus income) is normally an important means to this end, and is used as a measure of how well a country is performing. Nevertheless, there are at least three reasons to caution against the unconditional use of per capita GDP as a measure of development (Meier and Rauch, 2003: 5). First, since per capita GDP is a simple average, the distributional consequences are hidden. A rich minority can raise GDP, with no effect on poverty reduction. Second, GDP is not a measure of welfare. There are many examples of countries with similar income levels and widely differing average levels of health or life expectancy. Third, price levels vary across countries, so that mere exchange rates give a misleading interpretation of income levels. Conversion into purchasing power parities (PPP) improves the fit, even though distortions may still exist. In sum, income levels are one good signal of welfare, but should be complemented by other indicators in measuring development.

Does this imply that economic growth is not necessarily a means to achieve poverty reduction? Kuznets' (1955) famed inverted-u hypothesis argues that economic growth will lead income inequality to first rise, and then fall with development. If true, this could imply that sustained poverty and economic growth can co-exist as phenomena in the developing world. However, only mixed empirical support has been found for the inverted u-curve (Meier and Rauch, 2003: 376). Another question is how trade liberalisation specifically will effect income distribution, since it by nature implies economic adjustments and is likely to have effects on inequality. Taylor and Ocampo (1998: 1541) cite studies that show improved income distribution in some labour-abundant economies, but a worsening in income distribution for African economies and several middle-income countries. Dollar and Kraay (2004: F47), however, find no systematic relationship between changes in trade volumes and changes in household inequality.

Winters, McCulloch and McKay (2004) (WMM) take a different approach, surveying research on the specific links between trade liberalisation and poverty rather than inequality. Isolating the exact links between the two is an empirically challenging task because the concepts are not easily measurable, and because liberalisation rarely happens in isolation. WMM look at an analytical framework with a range of aspects and conclude that, although liberalisation broadly tends to reduce poverty, the existing literature does not warrant a general conclusion on the relationship. These reservations notwithstanding, I would still argue that economic growth is a desired outcome even though poverty reduction and improved welfare may not follow with necessity. In the words of WMM (ibid: 74): 'The key to sustained poverty alleviation is economic growth, as is widely accepted by economists and development practitioners. Although growth can be unequalizing, it has to be very strongly so if it is to increase absolute poverty.'

'The beauty and simplicity of such a theory are so great that it is easy to forget that it follows not from the actual facts, but from an incomplete hypothesis introduced for the sake of simplicity.'

John Maynard Keynes (1926, section III)

3. Trade and growth theory

Many studies have investigated the empirical relationship between openness and growth, and for a long time this strand of the literature developed largely independent of formal theory (Aghion and Howitt, 1998: 365). The purpose of this chapter is to give a brief exposition of the *theoretical* links between trade and growth. It will be argued that theoretical predictions as to the effect of openness on steady-state growth are fundamentally ambiguous, leaving the burden of proof to the empirical literature, which is surveyed in the next chapter.

3.1 Classical trade theory

Classical formal trade models of the Ricardo and Heckscher-Ohlin type employ a *static* framework in the sense that resources and technology employed in production are exogenous in the models. Free trade is then seen to promote efficiency through the division of labour and redistribution of productive activity across countries, thereby moving the world economy towards the international production possibility frontier. As such, a static framework predicts that freer trade will increase the *level* of income.[7] Technology is ascribed a role in determining trade patterns, but the reverse arrow of causality is not taken into consideration by the classical trade models. The emphasis is almost exclusively on the *effects* of technological disparities rather than its *causes* (Grossman and Helpman, 1995: 1281).

Although changes in technology and productivity are identified as the fundamental determinant of long-run growth, this is not formally linked to the organisation of international trade. In open-economy versions of the neo-classical growth models, it is international capital flows rather than trade flows that speed up the rate of convergence to the steady states. Classical trade models and neo-classical growth models therefore remain silent on the effect of trade on growth. Trade liberalisation that improves income *level* implies only a temporarily higher growth rate in the transition period. But barriers to free trade are not seen as having an effect on the steady-state growth of output.[8] The question of how freer trade will affect long-term rates of economic *growth* is certainly more complex, and may in one sense be

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[7] More recent trade models with increasing returns may make this prediction somewhat more nuanced for small countries.

[8] Ventura (1997) is a much-cited exception to the general view that classical trade models are not linked to long-run economic growth. He points out that for trading economies, given a weak form of the factor price equalisation theorem, the assumption of diminishing returns will apply to world averages rather than individual economies. Convergence is thus a result of structural changes in the economy rather than diminishing returns to capital.

more important: Think of a situation where the *static* income effect from trade liberalisation is low compared to the *dynamic* income effect though a change in long-term growth-rates. This may very well be the case, implying that policy advice should be based on how trade openness influences income *growth* rather than the income *level*.

Nevertheless, classical models highlight an interesting aspect of trade policy – how it can create domestic conflicts. Specialisation in a Heckscher-Ohlin model gives a net gain, but also implies domestic winners and losers as resources are shifted from one sector to another. Similarly, the Stolper-Samuelson theorem is often used to illustrate how changes in income distribution can explain domestic opposition to free trade. In a two-good, two-factor model (labour and capital) with constant returns to scale and incomplete specialisation, the theorem shows that an increase in the relative price of a good yields an increase in the real return to the factor used intensively in that good, with a corresponding decrease in the return to the other factor (Leamer and Levihnson, 1995: 1349). Owners of capital and workers will therefore have opposing interests in trade liberalisation. In Chapter 6 of this paper, I argue that domestic conflicts are crucial to how a country stands to gain from outward-oriented trade policies. I emphasise domestic conflicts due to external shock, taking trade policy as given, and do not model conflicts that arise due to policy *changes*. Nevertheless, the classical trade models are an important reminder of the strong link between trade policy and domestic conflicts.

3.2 From intuitive arguments to trade models with endogenous growth

Even though classical trade models generally failed to make the formal link between trade and technological progress, more qualitative arguments were still present in the debate (Grossman and Helpman, 1995: 1281–2). Openness was seen as having manifold benefits for the economy, due to both imports and exports. The principal idea is that trade promotes the diffusion of knowledge and technology across countries through several channels. First, domestic firms have better access to ideas, intermediate goods and services, machinery, and capital under open trade policies. Second, integration gives access to global markets and better profit opportunities for rewarding successful firms. Third, comparative advantage promotes the efficient allocation of scarce domestic resources. Fourth, consumers are better off with access to a greater variety of products. Fifth, with the advent of trade models for imperfect competition, openness could be used as a tool to break domestic monopolies and improve national and international competition. This list of arguments could have been made even longer and more detailed, and few would deny that at least some of these mechanisms are both important and relevant. However, without a formal modelling framework it is difficult to address theoretically the strength, relevance and validity of each factor for economic growth.

The development of endogenous growth models is often thought to provide that framework, and therefore be the missing link between trade openness and steady-state growth.[9] A common element of these models is that they emphasise non-diminishing returns to certain factors of production, for instance learning by doing or other forms of endogenous technological change. Grossman and Helpman (1995) survey the modelling efforts made, and argue that one clear distinction concerns the driving force behind technological progress. One strand of the literature looks at *learning by doing*, whereby the mere repetition of productive activities allows firms and industries to improve productivity. Another strand emphasises *research and development*, (R&D) where investments are primarily aimed at innovating new technology. Externalities may be present where these investments in knowledge generate spillovers and social benefits that are not captured by the private returns to individual investors. If such spillovers and innovations occur, a crucial question is their extent and scope: Do they spill over between firms, between industries, throughout the national economy, or even across countries? The assumptions a model makes about the nature of technological innovation, and the role of trade in diffusing knowledge, thus become critical for how it evaluates the effect openness on growth.

In a central contribution, Grossman and Helpman (1991) address the question of whether trade can promote innovation in a small, open economy – and conclude that it may, or may not. The answer depends especially on whether comparative advantage directs resources away from or towards activities that generate long-run growth via externalities in knowledge production. Specialisation may therefore either spur or slow down long-term growth. Aghion and Howitt (1998: 368-9) sum up the uncertainty of the theoretical predictions:

> The effect of the reallocation of resources induced by comparative advantage on growth is ambiguous, and depends very much on whether or not international trade in goods is associated with international spillovers of ideas. If knowledge spillovers are essentially national in scope, […] the well-understood static welfare gains […] may be offset by dynamic growth and welfare effects resulting from changes in specialisation patterns, for example with the less developed countries specializing in basic production activities in which there is little scope for accumulating new knowledge.

3.3 Ambiguous theoretical predictions: an example model

Rodrik and Rodriguez (2001) (RR) present a simplified model of Matsuyama (1992) that can help to illustrate the forces at work. The implications of varying the import tariff are examined in an economy with the two sectors agriculture (A) and manufacturing (M). Learning-by-doing is assumed to be external to individual firms, but internal and limited to the domestic manufacturing sector as a whole. Labour is the only factor that is mobile between the sectors, and the labour force is normalised to unity with

[9] It is beyond the scope of this paper to present the models in detail, so only some main points will be cited here. For a complete survey, see Grossman and Helpman (1991, 1995) and Aghion and Howitt (1998, ch. 11).

a share (n_t) in manufacturing. Production functions for manufacturing and agriculture can then be written:

(E3.1) $X_t^M = M_t n_t^\alpha$
(E3.2) $X_t^A = A_t (1-n_t)^\alpha$

where α is the share of labour in value added in both sectors (assumed identical for modelling ease), and *t* is a time subscript. *A* and *M* are productivity coefficients, the former exogenous and the latter a state variable evolving according to:

(E3.3) $\dot{M}_t = \partial X_t^M$

Here, ∂ is a parameter that captures the strength of the learning effect. The economy is assumed to have an initial comparative disadvantage in manufacturing. The relative world market price of manufacturing is unity, and the relative domestic price is (1+τ), with τ being the ad-valorem tariff rate. Equilibrium in labour markets requires the value of the marginal product of labour to be equal in both sectors:

(E3.4) $\alpha A(1-n_t)^{\alpha-1} = \alpha(1+\tau)M_t n_t^{\alpha-1}$

By differentiating E3.4 with respect to both n_t and τ, it can be checked that an increase in the tariff rate allocates a greater share of the labour force to the manufacturing sector:

(E3.5) $$\frac{dn_t}{d\tau} = \frac{M_t n_t^{\alpha-1}}{(1-\alpha)\left[A(1-n_t)^{\alpha-2} + (1+\tau)M_t n_t^{\alpha-2}\right]} > 0$$

Over time, learning by doing in manufacturing will increase the marginal product of labour in the sector. This will increase the labour share in manufacturing. Formally, this can be derived by differentiating E3.4 with respect to n_t and M_t, and then inserting E3.3 as an expression for dM_t. For a constant tariff rate, this implies that n_t evolves as follows, where $\hat{n}_t$ represents proportional changes:

(E3.6) $$\hat{n}_t = \frac{dn_t}{n_t} = \left(\frac{\partial}{1-\alpha}\right)(1-n_t)n_t^\alpha > 0$$

To evaluate the net effect of output growth, we first need an expression for the total value of output at world prices, denoted Y_t. Since both relative and absolute world prices are set to unity, this is found by simply adding E3.1 and E3.2:

(E3.7) $Y_t = M_t n_t^\alpha + A(1-n_t)^\alpha$

The instantaneous growth rate at world prices can therefore be expressed by differentiating E3.7 with respect to Y_t, n_t and M_t:

(E3.8) $dY_t = dM_t\left[n_t^{\alpha}\right] + dn_t\left[M_t n_t^{\alpha-1} - A_t(1-n_t)^{\alpha-1}\right]\alpha$

E3.6 and E3.3 are then inserted for respectively dn_t and dM_t. When combined with E3.1 and E3.2, this yields the following expression:

(E3.9) $\hat{Y}_t = \frac{\dot{Y}_t}{Y_t} = \partial\left[\lambda_t + \left(\frac{\alpha}{1-\alpha}\right)(\lambda_t - n_t)\right]n_t^{\alpha}$

The share of manufacturing output in total output is here expressed as $\lambda_t = X_t^m / Y_t$. All growth in this economy takes place in the manufacturing sector through dynamic learning effects; growth is strictly positive as long as $n_t > 0$ and is larger, the greater share of the labour force employed in manufacturing. If there is no tariff in place, then $\lambda_t = n_t$ and the growth expression E3.9 simplifies to the following, because the second term cancels:

(E3.10) $\hat{Y}_t = \partial\lambda_t n_t^{\alpha}$

A marginal increase in the tariff rate will have two effects. First, a small tariff will increase growth through an enlargement of the manufacturing sector (cf. with E3.5). This is expressed by the first term in E3.9. Second, a small tariff would make the labour share in manufacturing larger than the manufacturing share of output at world prices ($\lambda_t < n_t$). The tariff imposes a distortion on the production side by creating a wedge between domestic and international prices, as expressed by the second term in E3.9. This static inefficiency increases as the manufacturing sector becomes larger. As such, a tariff implies both a static inefficiency loss and a dynamic growth gain. Rodrik and Rodriguez (2001: 12) argue that the sum of these effects means that that marginal tariff changes will first have a positive effect on growth until a critical level, and then growth diminishes in τ. The effect is illustrated in Figure 3.1, adopted from RR (2001).

RR conclude that it is 'relatively straightforward to write a well-specified model that […] illustrates that there is no determinate theoretical link between trade protection and growth once real-world phenomena such as learning, technological change, and market imperfections (here captured by a learning-by-doing externality) are taken into account' (2001: 12–13).

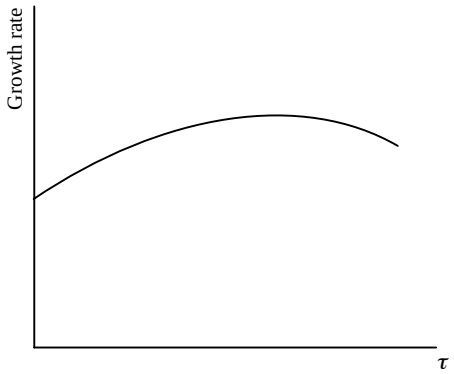

Figure 3.1: Relationship between tariff rate and growth rate at international prices for a particular parameterisation of the model, based on RR's (2001) figure II.1. The authors note that other patterns can be obtained for different parameterisations.

3.4 Summing up the theory

Endogenous growth models can be used to describe a scenario where free trade drives economies with inferior technology to specialise in traditional goods, thereby reducing long-run growth. As such, they can be read as a formalisation of the much-debated 'infant industry' argument, where temporary tariff protection is seen as necessary to catch up with the technological frontier. Historically, Prebish (1959) gave an important theoretical contribution that became linked to the import substitution policies implemented by many developing countries. Prebish argued that the income elasticity of demand is lower for primary commodities than for industrial products. Therefore, when global income levels increase, countries that have specialised in primary commodities will experience lower growth than industrial countries. Trade policy to promote the manufacturing sector was thus seen as necessary for ensuring long-term growth.

With other underlying assumptions, however, endogenous growth models can also predict a positive and universal relationship between openness and growth, irrespective of initial technology. Specifically, if knowledge spillovers are global in scope, trade can serve as an important vehicle for technological progress. Most theorists seem to support an optimistic view on the capacity of trade capacity to diffuse knowledge. Nevertheless, the conclusion from this review of trade and growth theory is that there exists no clear theoretical relationship between growth and openness in the existing literature. With ambiguous theoretical predictions, the relationship must ultimately be determined by empirical studies.

'We find strong association between openness and growth, both within the group of developing and the group of developed countries. […] Among developing countries, […] opening the economy has helped to promote governmental responsibility in other areas. To that extent, trade policy should be viewed as the primary instrument of reform.'

Sachs and Warner (1995: 35, 63)

'Our concern is that the priority afforded to trade policy has generated expectations that are unlikely to be met, and it may have crowded out other institutional reforms with potentially greater payoffs. […] What we dispute is the view, increasingly common, that integration into the world economy is such a potent force for economic growth that it can effectively substitute for a development strategy.'

Rodrik and Rodriguez (2001: 62–3)

4. Trade and growth – brief overview of empirical findings

The literature on trade and growth is extensive indeed. Here I will limit myself to some important contributions that can highlight empirical conclusions and some main controversies. A good point of departure is the influential contribution by Rodrik and Rodriguez (2001) (RR). From research in the 1990s, there seemed to emerge a general consensus that liberal trade policies were positively correlated with growth. Rodrik and Rodriguez challenge that consensus by pointing to methodological deficiencies found in four articles: Dollar (1992), Sachs and Warner (1995), Ben-David (1993) and Edwards (1998). These articles were chosen because they are the most cited in the subsequent literature and among the best known in the field. RR also comment on a methodologically innovative contribution by Frankel and Romer (1999).

4.1 Dollar's price level approach

Dollar's (1992) ambition is to test empirically that outward-oriented economies grow faster than inward-oriented economies. Dollar argues that outward orientation allows countries to use external capital to finance development, and that the export growth associated with outward orientation is a catalyst of technological advancement. At the time of writing, developing economies in Asia had experienced much faster growth than their counterparts in Latin America and Africa. Dollar defines outward orientation as a combination of two factors: 'First, that the level of protection, especially for inputs into the production process, is relatively low (resulting in a level of the exchange rate that is favourable to exporters); and, second, there is relatively little variability in the exchange rate, so that incentives are constant over time.' (ibid: 524). While empirical work thus far had concentrated on the latter of the two factors, the main contribution of

Dollar's article is to focus on the former by constructing an index for exchange rate distortion. The index is shown to be negatively correlated with growth in a subset of 95 developing countries measured in the period 1976 through 1985.

The conceptual foundation for Dollar's work is the law of one price, which predicts the alignment of the price of tradable goods when there are no barriers to trade. Instead of attempting to construct an index of trade barriers directly, Dollar argued that non-alignment of the price level – as measured by the degree of exchange rate distortion – must be an effective measure of the protective barriers that distort prices away from their free-trade level. An overvalued exchange rate is thought to be supported by protective trade measures and incentives geared towards domestic market production, and thus be indicative of inward orientation. Indeed, Dollar (1992: 525) found that Latin American and African exchange rates were, on average, respectively 33% and 86% overvalued relative to the Asian rates. He further found this index of exchange rate distortion to be correlated with growth, with the most open quartile exhibiting 4.2% higher per capita growth rates in the 10-year period. Dollar (1992: 540) could thus conclude that 'these results strongly imply that trade liberalization, devaluation of the real exchange rate, and maintenance of a stable real exchange rate could dramatically improve growth performance in many poor countries'

In their commentary on Dollar, Rodrik and Rodriguez (2001) argue that a price index for tradable goods is an inadequate way of measuring trade protection. Firstly, they show that Dollar's indicator cannot be reconciled with the Lerner (1936) symmetry theorem, which postulates that import and export taxation will have equivalent effects.[10] In Dollar's index, export taxes will make a country appear to be more outward-oriented than import taxes. Secondly, RR argue that the law of one price does not hold, because empirical studies have found that the nominal exchange rate is more important in determining the real exchange rate than are transport costs and trade barriers. Thirdly, they argue that the index is likely to be affected by trade routes and geographic variables, and find that more than half the variation in Dollar's index can be explained by a set of geographic variables and a measure of the black-market premium. In sum, they find that the index for real exchange rate distortion is an appropriate measure of trade policy only when geography and export-related policies have negligible effects, and when the law of one price holds continuously. Since these requirements are counterfactual, RR conclude that the variation in Dollar's index is not driven by trade policy and cannot be used to deduce trade policy implications.

[10] The Lerner (1936) symmetry theorem is the hypothesis that a tax on all imports will, *ceteris paribus*, have an identical effect as an equal tax on all exports. Building on the critical assumption that trade is balanced, the intuition is that a change in the value of imports must be matched by an equal change in the value of exports.

4.2 Sachs and Warner's openness index

Sachs and Warner's (1995) (SW) 'Economic Reform and the Process of Global Integration' attempts to document some common denominators in world economic development between 1975 and 1990. As the categories of the Cold War have become decreasingly relevant, they argue, we have witnessed a grand integration of national economies with the world economy. This integration implies not only increased 'market-based trade and financial flows, but also harmonization with regard to trade policy, legal codes, tax systems, ownership patterns, and other regulatory arrangements' (ibid: 2). SW see trade liberalisation as the motor that drives this broadly defined global integration, and consider it the benchmark of an economy's overall reform programme: 'The international opening of the economy is the sine qua non of the overall reform process' (ibid). Furthermore, they replace the old convergence hypothesis of economic growth theory with a hypothesis of conditional convergence: only countries that are integrated into the global economy will manage to catch up to the income levels of industrial nations.

In contrast to Dollar, SW take a more direct approach in measuring economic openness, and construct a dummy indicator. The SW index of openness is an important indicator and has become a much-cited point of reference in trade and growth regressions. In their dichotomous indicator, a country is classified as 'closed' if it meets any of the following five criteria (Sachs and Warner, 1995: 22):

C1) average tariff rates of 40% or more
C2) non-tariff barriers cover 40% or more of trade
C3) a socialist economy
C4) a state monopoly on major exports
C5) a black-market exchange rate depreciated by 20% or more relative to the official exchange rate, on average, during the 1970s or 1980s. (Sachs and Warner looked at growth from 1965 to 1990.)

The rationale for creating a combined indictor is that policymakers can close an economy to international trade through many channels. Tariffs and quotas distort trade flows directly, but non-tariff barriers also have important effects. Price distortions and unpredictability related to currency exchanges can also act as impediments to trade. Institutional arrangements like export marketing boards will, according to the Lerner symmetry (1936), have the same effect as taxing imports. A further rationale for such a combined indicator is that these factors will often be highly correlated. By merging them into a single variable, econometric problems related to multi-colinearity can be avoided. In their regressions, Sachs and Warner (1995: 47) find that open economies on average grow by an impressive 2.2–2.5 annual percentage points faster than closed economies, depending on the specification used. The results are highly significant and robust to changes in the list of controls. The channels through which trade affects growth are many, according to SW: increased specialisation, more efficient resource allocation, knowledge diffusion through trade and sharpened domestic competition (ibid: 3).

Rodrik and Rodriguez (2001) scrutinise these results on two accounts: They first ask which of the five factors C1–C5 are decisive in explaining growth, and find that the strength of the result can be traced to two variables: black-market premium (C4) and state monopoly of exports (C5). Tariffs and non-tariff barriers, which are the most direct measures of trade policy, have more marginal effects on growth. The effect of adding C4–C5 to the criterion list, compared to an openness indicator consisting only of C1–C3, is to classify as 'closed' an additional 15 African and 12 Latin American countries – all of which have lower growth rates than the sample average. The Latin American economies are included due to C5, the African economies on account of C4.

Second, they examine the results by asking how representative C4 and C5 are for trade policies. The data for state monopoly on major exports (C5) are taken from a World Bank study of African economies that carried out structural adjustment programmes (SAP) from 1987 to 1991. Both African economies not under SAPs and non-African economies escaped scrutiny. RR argue that this creates a selection bias, they furthermore show that C4 is virtually equivalent to using a dummy for sub-Saharan Africa: C4 therefore shows that sub-Saharan economies have grown more slowly than the rest of the sample, but is uninformative concerning trade policies per se.

RR continue their analysis by looking more closely at the black-market premium indicator C5. They claim that such premium levels arise only when an economy experiences sustained macroeconomic imbalances that are associated with economic mismanagement and increased corruption. This may imply that there is a direct effect of C5 on growth that does not go though trade policies:

> It is reasonable to suppose the existence of sizable black market premia over long periods of time reflects a wide range of policy failures. It is also reasonable to think that these failures will be responsible for low growth. What is debatable, in our view, is the attribution of the adverse growth consequences exclusively to the trade-restrictiveness effects of black market premia. (RR, 2001: 32).

In sum, Rodrik and Rodriguez argue that the openness indicator becomes a super-variable that takes the value 1 only if an economy is non-African and stable in political and macroeconomic terms. Since the explanatory power of the indicator comes from C4 and C5 and these are likely to give upwards-biased estimates, RR conclude that the SW indicator provides a risky basis for drawing conclusions about the effect of openness on growth.

4.3 Ben-David on income convergence, Edwards' openness measures

Ben-David (1993) is chosen by RR as a representative of the literature that studies income convergence amongst countries that undertake trade liberalisation. The factor price equalisation theorem predicts that free trade will tend to make factor incomes even out across national borders. If countries converge toward higher rather than lower incomes – which in fact took place with the advent of a European customs union – that could lend support to the link from trade openness to higher levels of GDP per capita.

Ben-David seeks to demonstrate that European income convergence was due to trade liberalisation, by ruling out other plausible explanations. First, Ben-David argues that convergence was not a continuation of a long-term trend. Second, he shows that non-EEC countries experienced convergence after joining the customs union. Third, like Sachs and Warner (1995), he argues that there is a global tendency for income convergence only among the countries that undertake liberal policies. US states and European countries experience convergence because of economic integration, whereas elsewhere the current trend is towards divergence.

In response to the first argument, Rodrik and Rodriguez (2001) argue that the sample is biased because Ben-Davis wrongly excludes Germany, and also that a trend of long-term convergence can be demonstrated by more recent data. To the second argument, RR employ an alternative method to show that some of the non-EEC members that later joined did experience convergence, but not as many as Ben-David claim. This in itself is not a sufficient argument for attributing the selected convergence to trade liberalisation. To the third argument, RR claim that the test is insufficient because the US states and European countries are geographically adjacent. A better test would be to demonstrate convergence among all geographically adjacent regions that liberalise. However, RR argue that the examples of Asia and Latin America since the 1960s falsify this hypothesis: Asia diverged with open trade policies, and Latin America converged with restrictive trade policies. Finally, RR cite Slaughter (2000) who employs a more advanced statistical technique on the sample analysed in Ben-David (1993) as well as other samples. Slaughter's (2000: 1) finds no 'strong, systematic link between trade liberalisation and convergence. In fact, much evidence suggests trade liberalisation diverges income among liberalisers'.

With respect to Ben-David, let me add a final clarification on my own account: Even if convergence towards a higher level of per capita income were to be demonstrated among countries that liberalise, this would affect only the *level* of GDP and temporarily increase growth. A relationship between openness and long-term *growth* rates cannot automatically be deduced from a pattern of income convergence.

In contrast to Ben-David, Edwards (1998) takes a more traditional econometric approach to studying openness and growth, and is chosen by RR because of his broad approach to the concept of openness. Edwards (1998: 383) argues that two issues are at the core of the controversy between sceptics and supporters of trade liberalisation in favouring growth: 'First, until recently theoretical models had been unable to link trade policy to faster equilibrium growth. And second, the empirical literature of the subject has been affected by serious data problems.' Edwards points to a theoretical link provided by new growth theorists like Barro and Sala-i-Martin (1995), who argue that more open economies have a greater capacity for growth-promoting technology absorption. He then surveys existing indicators of openness and argues that each of the alternative measures has some drawback attached to it. To mitigate the data problems, he suggests a new approach where as many alternative indicators as possible are used to verify the robustness of the correlation at hand. In his analysis of total factor

productivity (TFP) growth, Edwards proceeds to use nine different indicators of openness: three directly linked to quotas and tariff levels, five composite indices and finally the black-market premium. Finding that all coefficients but one indicator had the expected sign, and that 13 of 17 regressions carried out passed standard significance tests. Edwards (1998: 391) thus concludes: 'these results are quite remarkable, suggesting with tremendous consistency that there is a significant positive relationship between openness and productivity growth'

RR criticise Edwards mainly on the econometric soundness of his approach. In brief, they argue that his results are econometrically flawed due to inappropriate weighting of the data and unwarranted identification assumptions. Once these factors are controlled for, only three indicators remain significant. RR further argue that these are significant because of poor data quality. By using a more updated dataset, RR find entirely different data on trade tax revenue as a proportion of total trade, and argue that their figures are better because they more correctly reflect actual levels of protection. The two remaining variables are subjective measure of trade openness. RR argue that these can be problematic because they are constructed *ex post*, and give examples of bias where countries with high growth are misleadingly classified as 'open'. Having controlled for empirical shortcomings, RR argue that there is little support in Edwards' article for the existence of a robust relationship between openness and TFP growth.

4.4 Frankel and Romer's geographic approach

A measure of openness that Edwards does not include in his indicator list is the trade share in a given economy, measured as (imports+exports)/GDP. One reason for not mentioning the indicator may be that it does not measure trade policy per se. A second reason may be that it is generally seen to be affected by income levels directly, making it endogenous in growth regressions. The novel contribution of Frankel and Romer's (1999) (FR) article is to construct an instrumental variable (IV) for the geographic component of countries' trade. In this setting, an instrumental variable affects the trade share but is itself unaffected by income or growth. Empirical research has shown that bilateral trade flows are strongly affected by geographical factors.

Through a gravity approach,[11] FR (ibid: 380) estimate bilateral coefficients for two counties on the basis of a set of geographical characteristics proper: size measured by population, distance apart, a dummy

[11] The intuition for a basic gravity model is that distance is important in explaining bilateral trade flows between two countries, much the same way as distance determines the forces of gravity. A model for estimating bilateral trade flows between country i and j could be specified as follows: $T_{ij} = \alpha_0 + \alpha_1 D_{ij} + \alpha_2 S_i + \alpha_3 S_j + \varepsilon_{ij}$ Here, T is bilateral trade, D distance apart and S a country characteristic such as size – but also other country features could be incorporated. Once the coefficients have been estimated in a first-stage regression, the fitted values can be used to predict trade flows. FR use the predicted trade flows to construct trade shares, which are entered as an instrumental variable in second-stage regressions. Noguer and Siscart, (2005) (below) use the same general approach.

for whether they share a border, and a dummy if at least one of the countries is landlocked. They find that these variables are important determinants of trade (R^2=0.36). Then, for each country, the fitted values for each trading partner are summed up to find the predicted trade share, which is subsequently used as an IV in their income regression. FR find that the IV estimates of the trade share are larger than the OLS estimates: in the largest sample, a one percentage point increase in the trade share is associated with income increases of 0.85 and 1.97 percentage points, respectively (ibid, table 3). The coefficients are moderately significant, but the IV and OLS estimates are not statistically different from each other. Combined with other tests of robustness, the results give no indication that the original OLS procedure was endogenously biased. FR warn that the coefficients are not estimated with great precision, but nonetheless conclude that greater trade unconditionally raises income. As to policy recommendations, FR (ibid, 395) sum up that 'our results bolster the case for the importance of trade and trade-promoting policies'.

FR acknowledge that a potential limitation of their results may be that geography-induced trade affects income differently than policy-induced trade. In their review of the article, RR elaborate on this point, claiming that the link between income and trade *volume* necessarily has implications for trade *policy*, since protectionist measures often work by altering the content of trade, rather than mere quantity. Another concern raised by RR is whether FR's instrumental variable is a good econometric instrument. If geography affects income by means of other channels than trade – for example, through tropical diseases that negatively affect human capital – the estimators could be biased. To test for this possibility, RR include a new set of geographical estimators that prove significant, indicating that non-trade effects of geography may be decisive for the results. Once geographical controls are included, the trade indicator is no longer significant.

4.5 More recent research

Thus far I have followed Rodrik and Rodriguez (2001) (RR) as a basic structure for this brief overview of empirical research on the linkage between trade and growth. This choice has highlighted the different approaches and arguments present in the literature. But this overview would not be complete without more recent research on the topic. Here I present three strands of the literature which provide further insight into the issues at hand: first, a deeper investigation into Frankel and Romer's (1999) geographically based IV-methodology; second, a widely acknowledged paper by Wacziarg and Welch (2003) that uses an updated version of the Sachs and Warner (1995) openness indicator and also looks at specific episodes of liberalisation; and third, an approach that considers the role of market access in promoting growth. For a more complete survey of recent literature, readers are referred to Winters (2004).

4.5.1 Geography

In commenting on Frankel and Romer (2001), RR were concerned that geography might have a direct effect on growth that did not go through trade

– thus biasing their instrumental variable through a spurious effect. Several works have addressed this concern. Frankel and Rose (2002) repeat the essential analysis of FR and find that the instrumental variable for trade retains all its magnitude and most its significance, even when several different geographic and institutional variables are included in the specification. Continental dummies, an institutional measure, distance from the equator as a proxy for institutional quality as suggested by Hall and Jones (1999), and a dummy variable for a tropical climate were all included in the list of controls. The control variables were entered separately into the regression equation. Irwin and Terviö (2002) perform an analysis employing FR's methodology on a broad dataset with observations from before, between and after the two world wars. They confirm FR's results and find them robust to most geographical variables, except distance from equator (latitude). The OLS estimates show a consistent downward bias compared to the IV estimates.

Noguer and Siscart (2005) (NS) also perform an analysis using the Frankel-Romer method and substantiate the findings, including robustness to latitude. The additional contribution of their study is twofold. First, they claim to do away with imprecise estimates that pass significance tests only marginally. Having improved several dataset shortcomings, they achieve results all significant at the 95% level. Second, and more importantly, NS perform specifications that include the geographical control variables not only in the second stage, but also in the first-stage gravity regression that provides IV estimates of the trade share. These prove to have a significant effect on the instrument, thus suggesting misspecification in the original first-stage regression. Arguing that they have controlled for all other plausible links between trade and income, NS perform the second-stage regressions and still find a statistically significant effect from trade share on income. However, magnitude has decreased. Depending on which control variable is used, the coefficient estimates in NS as well as in Frankel and Rose (2002) range between 0.79 and 1.28, measured as the percentage point effect on annual growth by a one percentage point increase in the trade share.

Summing up, recent research seems to have adequately addressed Rodrik and Rodriguez' concern that the existing correlation between trade share and income may be spurious. However, progress has not been made on the question of relevance for trade policy. Although the results indicate that geography-induced trade promotes growth, that does not directly and without qualification apply to policy-induced trade. Trade policy can also be used to alter trade *content* as well as trade *volume*. NS bring up these concerns and conclude that 'our study cannot answer the (interesting and important) question of whether trade policy liberalisation raises income' (Noguer and Siscart, 2005: 457). This seems to be a pervasive concern for this type of analysis.

4.5.2 Market access

Inspired by Frankel and Romer (1999), Romalis (2005) represents an innovative approach to analysing the relationship between openness and growth. Instead of using geographical factors in constructing an instrumental

variable for openness, Romalis' instrument is market access as measured by the USA's Most-Favored Nation (MFN) applied tariff rate. Liberalisation in one large developed country is based on exogenous factors and should therefore be less susceptible to the endogeneity problems that arise when developed countries themselves liberalise, he argues. More openness through greater market access is found to have a positive and significant effect on growth. Maurseth (2005) argues that the literature is deficient because it fails to distinguish between the impacts of market access abroad and liberal trade policies at home. Also inspired by Frankel and Romer (1999), he creates an approximate measure of market access with a first-stage bilateral gravity equation that includes levels of GDP in both countries. The results from a second-stage regression that includes continental dummies indicate a substantial impact of trade on growth, though only marginally significant.

4.5.3 Sachs and Warner's openness indicator revisited

A working paper by Wacziarg and Welch (2003) (WW) has attracted much attention and is widely referred to in the literature. WW look back to the basic framework on economic integration and openness proposed by Sachs and Warner (1995), and extend their approach in two important ways. First, they revise the dataset and include information for the 1990s. The SW indicator for openness is employed, but found not to be significant for the new period under consideration. That indicator also fails to distinguish between converging and diverging economies, with the coefficient signs actually indicating greater convergence in inward-oriented economies. A new global economy where most countries are open to at least moderate forms of trade may be one possible explanation for the failure of the indicator, WW argue: the openness indicator may not be sufficiently rigorous to discriminate between slow and fast growing economies in a context where even small trade barriers can have adverse effects.

The second contribution of WW's study is to analyse how episodes of liberalisation affect growth rates, using the year where the SW switches from 0 to 1 as a measure of liberalisation. WW estimate that liberalisation raises the annual growth rate by 0.56–1.53 percentage points on average, depending on which controls are used. In support of their idea that liberalisation actually meant an outwards orientation of the economy, WW perform analyses that indicate that the trade share of GDP increased by roughly 5 percentage points in most periods. Still finding significant effects when the three years immediately following a liberalisation episode are excluded, WW take this as a weak indicator that the results are robust to business cycle variations. Because trade liberalisation may go together with other domestic policy reforms, WW acknowledge that the results cannot be interpreted as the direct effects of trade liberalisation per se: 'A more realistic interpretation of our estimates is that they capture the impact of trade-centered reforms more broadly' (ibid: 20). In the final section of their article, WW discuss individual country cases and show that there is considerable heterogeneity in the growth effects of trade reform.

One potential weakness of the WW results is that they are subject to the Rodrik and Rodriguez criticism of the SW openness indicator. In WW's dataset, only 4 of 42 countries were for the 1990s classified as 'closed' on

the criteria (C1–C3) directly related to trade policy. The rest were classified as 'closed' based on the black-market premium (C5) and export marketing board (C4) criteria. WW themselves recognise that 'our status dummy variable for 1990–1999 is subject to the same objections that RR placed against the SW classification for the 1970–1989 openness dummy […] [and] also to some extent in terms of [countries'] liberalisation dates'(ibid: 9). One possible implication of the RR critique may be that the liberalisation results reported above can no longer be interpreted as exclusively due to trade-centred policy reforms, but must be extended to all types of macroeconomic reforms in general.

4.6 Summing up the literature

Many variables influence growth, and more research is needed to completely understand the role of trade in a pro-growth policy mix. In their concluding comments, Rodrik and Rodriguez (2001) present two interesting recommendations for future research. First, they argue for an ascetic stance in choosing trade policy indicators. Simple tariff averages or non-tariff barrier measures are easier to distinguish from macroeconomic performance, and yield quite representative rankings of trade restrictiveness across countries, in their view. Second, RR argue that much of the heterogeneity in the data might be better understood by looking at *contingent* relationships between trade policy and growth: Trade policy might have different effects on different economies, depending on a mediating circumstantial factor.

A conclusion from this brief overview of the literature is that most studies lend support to the concept of a positive relationship between openness and growth. It should also be clear, however, that econometric challenges persist in cross-national analyses: measurement problems, endogenous variables and omitted variable bias are endemic to the regression specifications in general, and particularly to the openness measures employed. Although most studies find a positive relationship on average, they also stress the existence of heterogeneity in the effect of outward orientation on growth. There is a wealth of research on the subject, but many contributions are marred by the methodological shortcomings of previous work. All in all, clear and robust relationships between openness and growth have yet to be established.

5. The role of institutions

The role of institutions in promoting growth has received considerable attention in recent years, from both academic and policy circles. In addition to the traditional emphasis on getting prices right, the strategies for 'good governance' advocated by the IFIs now include institutional reforms.[12] Improvements in judicial, regulatory, monetary and fiscal capacities are encouraged, and seen as crucial for ensuring the effectiveness of other reform measures. In academic circles, several pioneering contributions have sought to establish the empirical connection between institutions and economic growth – such as Knack and Keefer (1997), Rodrik (1999a), Hall and Jones (1999) and Acemoglu, Johnson and Robinson (2001) and Rodrik, Subramanian and Trebbi (2002)[13]. In the words of Rodrik (2004: 1):

> There is now widespread agreement among economists studying economic growth that institutional quality holds the key to prevailing patterns of prosperity around the world. Rich countries are those where investors feel secure about their property rights, the rule of law prevails, private incentives are aligned with social objectives, monetary and fiscal policies are grounded in macroeconomic institutions, idiosyncratic risks are appropriately mediated through social insurance, and citizens have recourse to civil liberties and political representation. Poor countries are those where these arrangements are absent or ill-formed.

The purpose of discussing institutions here is twofold. First, I wish to give an overview of the recent literature on institutions and economic growth. Second, in the following chapter, I hope to develop a theoretical framework for the main hypothesis in this paper: that the effect of trade openness on economic growth depends on the institutional context.

5.1 What are good institutions?

The above citation from Rodrik points to some factors that are commonly integrated into the concept of 'good institutions', as it has been used in the development literature. Yet the quote also illustrates the complex and broad nature of the expression. Observers have warned that the term may become unclear and diluted. On the one hand, there has been a tendency to reduce the significance of institutions to a question of property rights, thereby missing many important dimensions. Such reductionism has sometimes

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[12] According to Chang (2002: 69–70): 'Exactly which institutions should go into the 'good governance' package differs from one recommendation to another. [...] However, this package of 'good institutions' frequently includes democracy; a clean and efficient bureaucracy and judiciary; strong protection of (private) property rights, including intellectual property rights; good corporate governance institutions, especially information disclosure requirements and bankruptcy law; and well-developed financial institutions. Less frequently included but still important are a good public finance system and good social welfare and labour institutions providing 'safety nets' and protecting workers' rights.'

[13] Even though the institutional perspective is relatively new to economics, it has been discussed in other academic disciplines (political science in particular) for a long time.

tended to foster a mono-causal view of institutional development with particular focus on formally instituted legislation for the protection of private property. On the other hand, there are dangers in using a catch-all concept where 'all good things' are included. Merging different aspects of development in a single variable blurs the specific causal relationship at work in stimulating economic growth: Although we are headed in the right direction, it may become difficult to draw up precise relationships and subsequent policy implications when the variables are too wide. In sum, it seems that the broad notion has opened up for new perspectives on development. Still, researchers need to define just how they apply the concept in specific empirical works.

Institutions are by nature difficult to quantify. In applied work, they are usually measured indirectly. One common method is to construct institutional indices based on surveys of investors, academics and country experts. Rodrik (2004: 7) points out two major challenges that arise from such indirect methods: First, the institutional ratings are subjective and assigned ex post. The indices therefore run the risk of being influenced by other factors in the institutional environment, such as good economic performance.[14] Second, even if we assume that institutional outcomes are correctly measured, the ratings remain uninformative about the specific legislation, rules and institutional design creating that outcome. For instance, from empirical work we can conclude that growth is spurred when agents feel security for their investments – but we cannot infer the specific arrangement that creates the safe business environment. This implies that good institutions do not need to be identical institutions; that 'effective institutional outcomes do not map into unique institutional designs' (Rodrik, 2004: 9). Rodrik illustrates this point by comparing property rights in China and Russia in the mid-1990s. Russia had established a legal framework that was inefficient. China had no legal framework, but offered investors joint ventures with local governments. Because the government partners were promised a share in future profits, they effectively provided a guarantee against expropriation. Rodrik concludes: 'China was able to provide a semblance of effective property rights *despite* the absence of private property rights. The Russian experience strongly suggests that the obvious alternative of legal reform would not have been nearly as effective.'

Another possible deficiency in the institutional perspective is endogeneity: Good institutions may be both a cause and an outcome of economic wealth. Democratic institutions in particular have been subject to a heated debate. The early post-war view that poor countries could not afford expensive democratic participation has now turned to widespread – if not unanimous – agreement that democracy helps development. Even though the reverse arrow of causality from income to institutions is an important caveat, most scholars now agree that a move towards better institutions can be good for growth.[15] If developing countries wait for the more spontaneous institutional evolution that took place in the industrial world, this could prove long, costly, and with no guarantee of the desired results. For late

[14] Some authors refer to this as a 'halo effect'.
[15] See in particular the contributions surveyed below.

developers, it would simply be uneconomical not to take advantage of learning opportunities from the now-developed world.[16]

On the other hand, exactly how institutions should be improved in an individual state setting is a matter of debate (Chang, 2002: 70). One view, advocated by some academics and the IFIs in particular, is that more or less the same institutions are good for all countries. This implies that transplanting an institutional blueprint from industrialised nations to the developing world should be the preferred strategy. An opposing view emphasises that each country has its unique characteristics and therefore rejects the notion of universal institutions: each historical stage of development requires a unique institutional response. A third perspective can represent a middle ground, arguing that different institutions can work towards addressing a set of identical universal requirements. If, for instance, all societies need to institutionalise private property rights, the above-mentioned example of Russia and China shows this can be done by different means. Selective institutional characteristics are thereby adopted, but fitted to a national context. This third strategy is advocated by Rodrik (2004: 2), who also acknowledges that specific research here is not yet very policy relevant: 'What works will depend on local constraints and opportunities. The best that we can do as analysts is to come up with contingent correlations – institutional prescriptions that are contingent on the prevailing characteristics of the local economy. At the moment we are very far from being able to do this for any but a few institutional areas.'

5.2 Good institutions encourage growth

The contributions of Knack and Keefer (1995, 1997) (KK) are often seen as pioneering empirical investigations of the relationship between institutions and growth. The novelty of their approach was to use an improved and more comprehensive set of data in measuring institutions, based *inter alia* on information from the International Country Risk Guide (ICRG). First published in 1982, the ICRG is made available by a private consultancy that advises multinationals on country risk factors. KK (1995: 207) hypothesise that good institutions affect growth positively because economic agents are given incentives to undertake productive activities: 'Few would dispute that the security of property and contractual rights and the efficiency with which governments manage the provision of public goods and the creation of government policies are significant determinants of the speed with which countries grow.' KK (1995) find empirical support for this hypothesis. Further, KK (1997) find support for deficient institutions being a key factor in explaining why poor countries do not converge to higher income levels, as predicted by standard growth theory and the diminishing return to capital. Closely related to these findings, Hall and Jones (1999) find empirical support for their hypothesis that differences in output per worker across

[16] Chang (2002) gives an interesting historical overview of development, and argues that such learning is taking place. He shows, for instance, that universal suffrage tends to be established at lower levels of GDP per capita today than a century ago, when it was implemented in the now-industrialised countries.

countries is largely related to a variable they term 'social infrastructure': 'By social infrastructure we mean the institutions and government policies that determine the economic environment with which individuals accumulate skills, and firms accumulate capital and produce output. […] Such a social infrastructure gets the prices right so that […] individuals capture the social returns to their actions as private returns' (Hall and Jones, 1999: 84). Rodrik (1999a) also finds a strong link between certain institutional aspects and growth. Although institutions are generally viewed as important, there is no scholarly consensus that they are among the *most* fundamental causes of the large income differences across countries.

Institutions may themselves be endogenous, and this is as mentioned one of the main challenges in empirical work. Acemoglu, Johnson and Robinson (2001) (AJR) seek to overcome this difficulty by introducing a new instrumental variable – mortality among early European settlers. They argue that the geographical areas that posed the greatest health menace to potential colonisers were less likely to be permanently inhabited by Europeans. In these areas, the European colonisers were therefore prone to introduce only a minimal official framework for extracting resources, rather than setting up sound institutions for the protection of property rights. With this instrumental variable approach, two conditions are needed to achieve econometric identification using settler mortality. First, variation in settler mortality must be an important source of variation for institutional quality today (instrument relevance). Second, settler mortality must not have an effect on current income levels through other sources than institutional quality (instrument exogeneity). AJR argue that both of these conditions are fulfilled. Through a creative plunge into old historical records, they successfully use this technique to give further empirical support to the finding that institutions foster growth. Some commentators interpret the AJR study as evidence that different encounters with colonialism is the key to explaining economic performance in the developing world today. However, reading too much into the instrumental variable is misleading, as AJR (2001: 1371) themselves point out: 'Differences in mortality rates are *not* the only, or even the main, cause of variation in institutions. For our empirical [instrumental variable] approach to work, all we need is that they are *a source of* exogenous variation.' Summing up, these and several other contributions illustrate an emerging consensus among researchers that institutions are important in encouraging growth. Yet there is disagreement on the policy implications that can be drawn from this. Furthermore, there is still considerable controversy as to how important institutions are for growth *relative* to other factors.

5.3 Links between institutions and openness in the literature

The literature links institutions and openness in at least two important ways. The first strand tries to investigate how important trade openness is *relative* to institutional factors. The second approach involves looking at how openness and institutional factors interact, examining if there are possible policy complementarities that together can enhance growth.

5.3.1 Investigating relative importance

Rodrik, Subramanian and Trebbi (2002) (RST) represent an interesting attempt to uncover the long-run determinants of income and growth. Theory on economic growth has traditionally emphasised technological change and the accumulation of physical and human capital. At the next level, scholars would be interested in explaining what RST call the 'deeper' determinants that can explain uneven accumulation and innovation. In this field, RST distinguish between three schools of thought in the literature, depending on where the main emphasis is placed: on geography, integration or institutions. The geographic school puts climate, natural resources, transport costs, disease and technology diffusion at the centre. The integration view accentuates the role of international trade in propagating productivity. The institutional school highlights the rule of law and a social framework that aligns private and social interests. RST acknowledge that a complex web of causal factors are a major impediment to econometric research in this area, and that an empirical approach cannot adequately account for centuries of history. Nevertheless, RST try to assess these three deep determinants of economic growth vis-à-vis each other by uniting the instrumental variable approaches developed by AJR (2001) and Frankel and Romer (1999). Combined with the assumption that geography is exogenous, econometric identification becomes possible.[17] Using this framework, AJR find that 'the quality of institutions trumps everything else. Once institutions are controlled for, integration has no direct effect on incomes, while geography has at best weak direct effects' (2001: 4). This result holds for three different samples and also for alternative indicators of geography, trade and institutions.

Dollar and Kraay (2003) (DK) take a different approach to determining the relative importance of institutions and trade. They start with a cross-section of countries and substantiate what they view as a stylised fact: both factors are important for growth. However, DK argue that there is too little variation in the institutional independent variable and too much multi-colinearity in the data to disentangle the partial effect of each variable. They therefore undertake dynamic regressions where decadal changes in growth are viewed as dependent on lagged changes in trade and institutions, respectively. They follow Frankel and Romer (1999) in using trade shares as measures of openness, but use a variety of institutional indicators. With this latter approach, trade shows positive and significant effects in most specifications whereas institutions are found to play a smaller role. DK (2003: 161) conclude: 'these results are suggestive of an important joint role for both trade and institutions in the very long run, but a relatively larger role for trade in the shorter run.' One possible objection to the dynamic specifications is the absence of continental-time dummies. When these are added, RST (2002: 17) report that the trade coefficient becomes insignificant.

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[17] Assuming that geography is exogenous is standard in the literature. This assumption may not be entirely innocent if the significance of geography changes over time – for instance if an economic boom in neighbouring countries makes a certain location more attractive.

5.3.2 Investigating policy complementarities

A recent paper by Chang, Kaltini and Loayza (2005) represents a central contribution to the literature strand that examines how openness and institutions interact, looking for a possible role for policy complementarities. The main focus is on labour markets and openness. A model based on the Harris-Todaro framework is presented, showing that trade liberalisation in some instances may not increase efficiency if there are distortions in the labour market. Although they do not give specific applications, CKL (2005: 15) argue that 'the essence of the analysis can be extended to analyze the complementarity between trade opening and other reforms.' To econometrically capture possible interaction effects between openness (TRADESHARE) and other relevant country characteristics (X), the following single-variable interaction term is included as an independent variable in the regression specification:

(E5.1) INTERACTION = TRADESHARE * X

Each interaction term is used separately and entered into the regression specification, one at a time. CKL use difference equations as an estimation framework, similar to the regressions that DK (2003) use in the second part of their paper. The empirical analysis reveals a positive and significant interaction between labour markets and openness, in that greater flexibility reinforces the growth effects of openness. Similarly, CKL's analysis shows important policy complementarities between sound institutions and openness: 'The beneficial impact of an increase in trade openness on economic growth is larger when society has a more efficient, accountable, and honest government and where the rule of law is more respected' (2005: 23). There are also statistically significant interaction effects when other factors – like human capital investment, financial indicators and proxies for domestic firm-entry flexibility – are entered into the interaction variable (X). In summary, the authors conclude that the results underscore the importance of a comprehensive approach to economic reform.

The CKL paper uses the trade share of GDP as the measure of openness. However, with this measure it is not possible to separate policy-induced trade from geography-induced trade (see section 4.4). The link between income and trade *volume* does not necessarily have implications for trade *policy*. Although I believe the CKL paper represents an important contribution that underlines policy complementarities, it would be interesting to see the analysis carried out with an openness indicator with more direct implications for trade policy. It would also be interesting to see how the model presented for labour market distortions could be extended to include institutional factors, as suggested by the authors. The theoretical framework that I present in the next chapter to explain why institutions and openness interact does not build on the CKL model.

6. Why institutions and openness interact – a theory

Rodrik (1999a) hypothesises that external shocks will have long-term adverse effects on growth in societies that lack the institutional capacity to respond properly to them. He finds strong empirical evidence to support that hypothesis. In the present section, I take this framework one step further: As long as increased trade openness is likely to expose an economy to stronger external shocks, then openness will have adverse effects on growth in economies with weak institutional capacity. This argument will be developed in three steps.

6.1 The Rodrik framework

One of the motivations behind the Rodrik (1999a) article is to explain why developing countries responded very differently to the shocks to which they were exposed in the 1970s, a question that long had puzzled scholars of comparative economic growth. Rodrik (1999a: 386) postulates that social conflicts have a key role in explaining the variations in response:

> The core idea in this article is that the effect of external shocks on growth is larger the greater the latent social conflicts in an economy and the weaker its institutions of conflict management. […] I use the term *latent social conflict* to indicate the depth of pre-existing social cleavages in a society, along the lines of wealth, ethnic identity, geographical region, or other divisions. […] By *institutions of conflict management*, I understand institutions that adjudicate distributional contents within a framework of rules and accepted procedures – that is, without open conflict and hostilities. Democratic institutions, an independent and effective judiciary, an honest and noncorrupt bureaucracy, and institutionalized modes of social insurance are among the most significant of conflict management-institutions.

Rodrik gives the example of an economy that has been exposed to a price drop in its main export good. The textbook policy response is a combination of devaluation and a tightening of government expenditure. In enacting this response, policymakers can choose from a wide menu of measures (increased taxes, spending cuts, tariffs, wage controls etc.) and therefore determine who bears the cost of stabilisation. If the policy changes are carried out without harming existing social and distributional agreements, the shock can be managed. However, if the enacted measures trigger social unrest, the economy can be paralysed for years because of inadequate adjustments and the consequences that may ensue – such as high inflation, import reductions, debt, and exchange rate instability.

Rodrik further presents a simple model to illustrate how social conflict among groups can lead to coordination failure. In this model, the population is divided into two different groups and the resource level is normalised to unity. With the external shock, resources shrink to $(1-\Delta)$. If the groups choose to cooperate, each group is left with $\frac{1}{2}(1-\Delta)$. Alternatively, each group can fight to keep its previous share of $\frac{1}{2}$, letting the other group bear the burden of adjustment. Fighting or non-cooperation in itself induces a new cost that magnifies the effect of the original shock.

The new cost is incorporated into the catch-all variable *K* that Rodrik (1999a: 392) exemplifies with 'the damage done to economic activity by macroeconomic instability and delayed fiscal and exchange-rate adjustments.'

Building on these basic elements from Rodrik, I have constructed a slightly more formal modelling framework, with the following initial assumptions:

M1) $K > 0,\ \Delta > 0$
M2) Agents are risk-neutral.
M3) There are two groups. Group A faces a choice whether to fight or cooperate. Group B will always choose to cooperate.
M4) When choosing to fight, a group's probability to succeed in keeping its original endowment is given by *p. 0 < p < 1*.
M5) If a fight is unsuccessful, the costs Δ and K are split between the two groups.
M6) The quality of the institutions of conflict management is given by the parameter *I*.
M7) $p=p(I),\ p'(I) < 0$. This function simply specifies that poorer quality institutions are less resistant to groups that seek to grab resources.

	Successful fight, p	***Failed fight, 1-p***
Cooperate	½ (1- Δ)	½ (1- Δ)
Fight	½	½(1 - Δ - K)

Table 6.1 Resource allocation between groups after external shock

With the onset of an external shock within this framework, Group A must decide whether to cooperate or fight. The payoffs from cooperation (π_C) and fighting (π_F) are illustrated in Table 6.1. Choosing to cooperate means with certainty getting a payoff of π_C = ½ (1- Δ). With a risk-neutral agent, fighting will with a *p* probability of success yield an expected payoff of

(E6.1) $$\pi_F = p(I)\,½ + (1 - p(I))\,½\,(1 - \Delta - K)$$

The group will choose to fight if and only if $\pi_F > \pi_C$. This latter expression can be solved with respect to *p* to yield the following, with the right- and left-hand sides indicating the payoffs from fighting and cooperating, respectively:

(E6.2) $$\pi_F > \pi_C \Leftrightarrow p > \frac{K}{\Delta + K}$$

This is illustrated graphically in Figure 6.1 with *p* on the horizontal axis and payoffs (π_F, π_C) on the vertical axis. π_C is independent of *p* and is therefore shown as a horizontal line. π_F increases in *p* as indicated by the solid line. For values of *p* below *p**, cooperation is the preferred solution. For values of *p* above *p**, the group will choose to fight. All else equal, an increase in *K* will tilt the π_F -line downward, as indicated by the dotted line, and make fighting less likely. An increase in the loss due to external shock

(Δ) will both shift the π_C-line downward and tilt down the π_F-line. Algebraically, it can be shown that the effect on π_C is strongest, making fighting more likely.

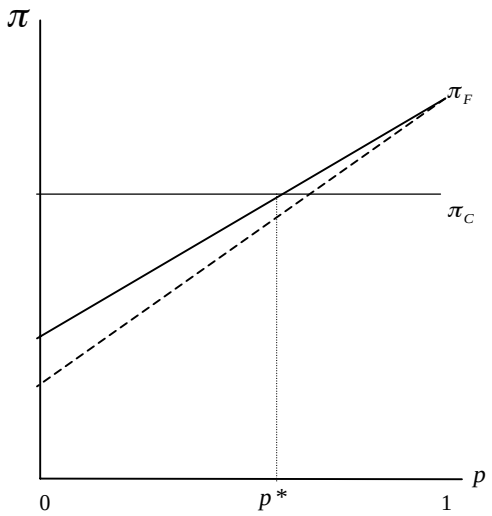

Figure 6.2: Fighting will occur only if institutions of conflict management are sufficiently weak.

The crucial point in the model is that the fighting will be a preferred solution only if the institutional environment is sufficiently weak – *p* decreases with the strength of conflict management capacity. Formally, this can be seen by taking the derivative of π_F with respect to *I*.

$$\text{(E6.3)}\quad \frac{d\pi_F}{dI} = p'(I)\tfrac{1}{2}(K+\Delta) < 0$$

When institutional quality increases, fighting with success becomes less likely. Because the expected payoff falls, agents will choose to cooperate, thus averting costly social conflict. In this sense, conflict management institutions derive their strength from being able to moderate the potential inequalities that arise from asymmetric claims to resources.

I will now look more closely at assumption M3. In many cases, it is quite realistic to assume that agents have asymmetric bargaining power, in the sense that only one group is able to fight and grab a disproportionate share of resources, whereas the other group lacks such an option. A strong ruling elite could be one such example, where the role of the other group could be captured by *K*, the costs (or price) of fighting if, for instance, social unrest breaks out. However, it would also be possible to replace M3 with the assumption that the two groups are symmetric, with each facing the identical choice of whether to cooperate or fight. With this new assumption, payoffs could then be modelled by the game matrix in Table 6.2.

		Group A	
		Cooperate	**Fight**
Group B	**Coop-erate**	$\frac{1}{2}(1-\Delta)$ $\frac{1}{2}(1-\Delta)$	$p(\frac{1}{2})+(1-p)(\frac{1}{2})(1-\Delta-K)$ $p(\frac{1}{2}-\Delta-K)+(1-p)(\frac{1}{2})(1-\Delta$
	Fight	$p(\frac{1}{2}-\Delta-K)+(1-p)(\frac{1}{2})(1-\Delta$ $p(\frac{1}{2})+(1-p)(\frac{1}{2})(1-\Delta-K)$	$\frac{1}{2}(1-\Delta-K)$ $\frac{1}{2}(1-\Delta-K)$

Table 6.2: A game matrix when players are symmetric. The top line in each quadrant indicates payoff to group A, and the bottom line represents the payoff to player B.

As long as the condition set forth in E6.2 holds, then the framework is transformed into a prisoner's dilemma game. In a one-shot version, the bottom right-hand quadrant represents the only equilibrium solution, because fighting is a dominant strategy for both players – each group will choose to fight irrespective of what the other group does. Only when strong institutions of conflict management sufficiently lower the potential return to non-cooperative behaviour by making $p < p^*$, will cooperative behaviour become an equilibrium solution and E6.2 will hold no longer.

Another scenario is to keep the condition in E6.2, looking at an iterated version of the prisoner's dilemma game. If the game were repeated n times, in particular with perfect information in the sense that players could coordinate before the game, there are theoretical strategies that could induce cooperative behaviour in all games except the final one. However, the equilibrium is fragile and the final n^{th} game would be no different from the one-shot game. Looking beyond the model to the present context, however, the social groups cannot know how many external shocks will hit the economy. The players therefore have incentives to play the game as a one-shot game. Furthermore, it can be argued that, in order to be successful, all cooperative strategies need an institutional anchor. In sum, good institutions of conflict management are necessary to avoid grabbing behaviour, for both symmetric and asymmetric groups.[18] In the words of Rodrik (1998b: 13):

> When conflict-management institutions are sufficiently strong, opportunistic behavior is not rewarded ex post, and therefore expectations about the other group's strategy have no bearing on the optimal choice. Cooperative behavior is the dominant strategy for each group. On the other hand, when conflict management institutions are extremely weak, there are large returns to

[18] Also assumption M5 above may be relaxed. With the specified payoffs and asymmetric players, fighting gives a larger share of a smaller pie to the 'winner', whereas the 'loser' gets whatever is left. However, one can also imagine a different division of this smaller pie to the 'winner' and 'loser', or even a more continuous pool of outcomes where there are no clear-cut victors of the game. The only minimum criterion for driving the model is that one group believes its expected payoff from fighting is larger than what would come from cooperating. Relaxing the assumption would require a more complex setup, but the conclusions from the framework would nevertheless hold.

opportunistic behaviour, and this can make fighting the dominant strategy irrespective of what the other group chooses to do.

The upshot of this model is that strong institutions for conflict management can prevent opportunistic behaviour from certain groups aimed a grabbing a disproportionate share of resources. In itself, this keeps the available pie from shrinking further. Rodrik (1999a: 393) further argues that it can be particularly difficult to coordinate a 'fair' distribution of resources in highly polarised societies. An interesting feature of the model is that this mechanism can be at work even with external positive shocks. If the social cost of non-cooperation *(K)* is large relative to the shock ($-\Delta$), the economy may actually suffer a net loss from the external windfall (see Tornell and Lane, 1999).

6.2 An extension on the high costs of uncertainty

A brief extension adapted from Rodrik (1991) can serve to illustrate exactly why the costs *(K)* associated with the non-cooperative solution can be very large. According to the above model, poor institutions of conflict management are likely to mean that the required policy response to a shock is misplaced, postponed or lacks popular support. There is uncertainty about the ability of government to enact proper macroeconomic policies. Consider this from the point of a private investor who can place available funds in either the domestic or foreign sector. There is a basic dilemma. On the one hand, the domestic economy is dependent on new investment to stimulate the economy, restore the macroeconomic capacities of government and create new growth. On the other hand, uncertainty about reform effectiveness provides rational grounds for withholding the investment until the shock has been properly managed. For a risk-neutral agent, the expected payoff *(R)* to an investment *(F)* placed domestically can be captured by the following expression:

$$\text{(E6.4)}\quad R = \alpha\underbrace{(1-\lambda)F}_{Term1} + (1-\alpha)\underbrace{(1+r)F}_{Term2}$$

Here, α represents the probability that government will not be able to undertake the appropriate policy response in the time perspective of the investment. λ is a term that can represent the costs of withdrawing the investment, reduced return or possibly sunk costs. r is the normal domestic rate of return. This means that the first term represents the payoff to an investor if reform fails, whereas the last term is payoff if reform succeeds. The opportunity cost *(R*)* is given by the return on the same investment *(F)* placed abroad.

$$\text{(E6.5)}\quad R^* = (1+r^*)F$$

Here, r^* represents the foreign interest rate. For any investment to take place domestically, the expected return must exceed or equal the opportunity cost ($R \geq R^*$). Differentiating E6.4 shows that the domestic investment level will, *ceteris paribus*, fall with increasing values of α :

(E6.6) $\frac{dR}{d\alpha} = F(-\lambda - r) < 0$

For given levels of r^*, α and λ, the minimal domestic rate of return *(r)* necessary to attract an investment will then be given by:

(E6.7) $R = R^* \Leftrightarrow r = \frac{r^* + \alpha\lambda}{1-\alpha}$

Furthermore, this implies that uncertainty creates an implicit tax *(t)* on domestic investments, even when agents are risk-neutral. That can be expressed by:

(E6.8) $r(1-t) = r^* \Leftrightarrow t = \frac{r - r^*}{r}$

For a telling illustration of the potential level of this tax rate, let me make the relatively realistic assumption that the foreign rate of return *(r*)* is 5%, and the sunk costs associated with domestic investments (λ) are 30%. In Table 6.3, values for *r* and *t* are calculated for different levels of α .

A (alfa)	r	t
0%	5%	0%
10%	9%	44%
20%	14%	64%
30%	20%	75%
50%	40%	88%

Table 6.3 Implicit tax on investments under uncertainty

To sum up, this simple extension shows that the implicit tax rate of even small levels of policy uncertainty can be substantial. This in turn indicates that the potential costs *(K)* following an external shock, with poorly developed institutions of conflict management, can be considerable.

6.3 Trade openness increases exposure to external shocks

Making these results relevant to the interaction between openness and institutions is now only a matter of one step: linking increased foreign trade with exposure external shocks. In the literature, it is commonly assumed that more openness will make an economy more vulnerable to external shocks (Rodrik, 1998; Kose and Prasad, 2002).

On the one hand, two intuitive theoretical arguments can be made to support this assumption. First, more trade openness increases the fraction of producers exposed to international competition and the share of imports in consumption. It is therefore a straightforward implication that a larger trade share (greater openness) means that the effect of an external shock will be broader and deeper. Second, openness is often associated with specialisation.

A less diversified economy may be more vulnerable to asymmetric external shocks that affect certain sectors only.

On the other hand, it is theoretically possible that external risk can counteract exposure to domestic risk sources and thereby reduce aggregate risk. First, access to larger international markets provides better stability for income and prices if country-specific shocks are lessened by the international opening of the economy. Second, access to international financial markets is in the literature often considered to have a role in mitigating external shocks. By placing money abroad, economic agents can in principle hedge against asymmetric shocks and thereby smooth out consumption patterns at home. In this arrangement, a group of countries that react differently to external shocks share the risks associated with openness. This second argument may be less valid in practice, because such arrangements involve significant transaction costs for individual households. Furthermore, institutional investors exhibit a bias for domestic investments that prevents extensive risk sharing.[19]

In sum, theory has mixed predictions on the effect of trade exposure on shocks in an economy. Nevertheless, empirical studies generally find support for a linkage between openness and risk exposure. Rodrik (1998) points to a robust, empirical linkage between openness and the size of governments. He argues that increased government spending appears to provide social insurance in open economies, and finds empirical support for his claim. Underlying this key argument is a positive correlation between trade openness and exposure to external shocks. McCarthy and Dhareshwar (1992) seek to explain why external shocks affect some economies more severely than others. A key finding is that 'the size and various components of the shock depends on such factors as [a country's] degree of openness, export/import composition' (ibid: 42). Furthermore, Rodrik undertakes an empirical analysis indicating that increased external risk exposure also gives an increase in aggregate risk: 'The results show that the three measures of income risk, as well as consumption risk, increase with exposure to external risk. This finding is robust to the inclusion of a wide range of additional controls.' (Rodrik, 1997: 57)

Economies with an export concentration in commodities may be particularly susceptible to external shocks. An IMF study has found that commodity prices are highly volatile and increasingly so after 1973: 'Rapid, unexpected and often large movements in commodity prices are an important feature of the behavior of commodity prices. Such movements can have serious consequences for the terms of trade, real incomes and fiscal position of commodity-dependent countries, and have profound implications for the achievement of macroeconomic stabilisation' (Cashin and McDermott, 2001: 25). The study argues that the findings are especially relevant to developing countries, many of which depend on one or two commodities for their main export earnings. When combined with the oil crisis in the 1970s and the debt crisis in the 80s, the overall picture seems to indicate that external shocks have been an important characteristic of the

[19] In the financial literature, this is known as the 'home bias puzzle'.

world economy in recent decades. In sum, it does not seem unreasonable to assume that more open economies are more exposed to external shocks and aggregate risk.

6.4 Summing up the theory

This chapter has developed a three-step argument for why there may be an interaction effect between openness and institutions. First, the Rodrik framework illustrates that strong institutions of conflict management are needed to deal adequately with external shocks. Second, external shocks can unleash social conflict that creates an uncertainty detrimental to economic growth. Third, more open economies are assumed to experience greater exposure to external shocks. Taken together, these stylised presumptions seem to indicate that sufficiently good institutions are required if one is to reap the growth benefits of economic openness. As such, there is an *a priori* rationale for the working hypothesis of this paper: that the growth benefits of openness vary with the institutional environment. Rodrik (1999b: 14) also draws attention to these complementarities between openness and sound institutions of conflict management:

> Openness will leave countries vulnerable to external shocks that can trigger domestic conflicts and political upheavals. These consequences are damaging not only in their own right, but also serve to prolong and magnify the effects of external shocks. The developing world has been buffeted by a series of external shocks since the 1970s […] [and shocks] will always be part of the global landscape. […] Therefore, the ability to manage turbulence in the world economy is critical component of a strategy of making openness work.

The reverse side of this coin is that openness may have adverse effects on income if institutional development is sufficiently low. Unless a strategy for outward orientation also works towards strengthening the capacity for conflict management, it may not be successful in fostering growth. A situation where decisions must be made to satisfy some optimal criterion (free trade) when others cannot be satisfied (institutions) is called a 'second-best optimum' after the general theory launched by Lipsey and Lancaster (1956). When one first-best optimum condition cannot be met for one reason or another, they argue that it would require an individual investigation on a case-by-case basis to ascertain whether it would be beneficial, in welfare terms, to satisfy further optimum conditions.

6.5 Competing theories

In the above framework, good institutions of conflict management are needed to offset the external shocks that follow from increased trade openness. But institutions and openness may also interact through other channels, and, depending on the sign of the interaction variable, may thus work to either strengthen or offset the effect outlined above. Activist industrial, trade and technological (ITT) policies may be one alternative channel. This competing interaction theory will be outlined in the following.

Multiple schools of thought have advocated development strategies for industrialisation that include active state intervention in the economy.

The theory basis for such policies can be found for instance in the infant industry argument, in the Rosenstein-Rodan (1943) idea of a big push, or in Prebish's (1959) theory that the income elasticity of demand for primary commodities is lower than for industrial products. Chang (2002) documents how today's industrialised countries relied on a range of interventionist measures to bring their economies to the level of technological sophistication that characterised the richest states at the time. These measures included industrial subsidies, public investment programmes, tariffs and quotas, active support for the acquisition of foreign technology and various forms of public–private cooperation. Measures to lower trade openness are usually a part of such a policy cocktail, although safeguarding against foreign competition can in principle be achieved by other means. A main criticism against activist ITT policies has been that entrepreneurs are given incentives for maintaining privileges rather than for investing in productive activities. Inefficient firms privileged by ITT policies run the risk of becoming a sustained drain on consumer and government budgets. To prevent a rent-seeking equilibrium, government must provide predictable and time-consistent incentives. This is a demanding task, and activist ITT policies are generally held to require a strong institutional framework. In the literature, good institutions are commonly associated with low levels of corruption. Well-intended efforts at promoting industrialisation or favouring certain growth-promoting sectors may turn sour if government is unable to withstand rent-seeking pressures from private interest groups. Strong institutions are therefore required to reap the gains from ITT policies.

This line of reasoning can indicate a negative interaction effect between openness and institutions: activist ITT policies (less openness) and good institutions may work together to promote growth. This effect depends critically on two criteria. First, the activist policies must be more effective in enhancing growth than a laissez-faire approach. Second, protective trade measures that lower the level of openness must be an integral part of these policies. The first question is has long been without scholarly consensus, whereas the second aspect depends on the specific ITT policies put in place. Nevertheless, the negative interaction effect from ITT policies and institutions depends crucially on both these criteria being fulfilled.

I have now identified two possible interaction effects between institutions and trade openness that point in opposite directions. In testing empirically for interaction effects in the next chapter, it is methodologically complicated – if indeed all possible – to separate the two effects. In practice, the effects can cancel each other, or one may dominate the other. There may be grounds for arguing that the negative interaction effect (ITT policies and institutions) must meet more demanding criteria than the positive interaction effect (openness and external shocks). As such, the net interaction effect is likely to be negative. Nevertheless, the outcome is not given *a priori* and must be determined empirically.

7. Empirical testing: Is there an interaction effect between openness and institutions?

In this chapter, I want to undertake an empirical investigation of the hypothesis that trade is a better growth-promoting policy tool in a strong institutional environment than in an environment with poorly developed institutions. The basic methodology I will follow involves regressing economic growth on a set of variables that includes indicators of trade openness and institutions.[20] In the past 10 to 15 years, there has been a marked growth in studies that use this approach to find linkages between economic growth and openness. There are thus many researchers who have set a framework for empirical investigations of this type.

7.1 Theoretical framework for growth regressions

The aim of regression analysis is to explain variation in a dependent variable by a set of independent variables. In the specification of an econometric model, an error term is included to capture the variation in the dependent variable that cannot be explained by independent variables. In standard ordinary least-square regressions (OLS), the following assumptions are commonly made (Hill et al., 2001; Kennedy, 2003):

A1) The expected value of the disturbance term is zero.
A2) Disturbances have uniform variance and are uncorrelated.
A3) The independent variables are exogenous and fixed in repeated samples.
A4) There is no exact linear relationship between any of the independent variables, and there are more observations than independent variables.
A5) The error term is normally distributed.

When all these assumptions are satisfied, our estimators will be not only unbiased but also BLUE – best linear unbiased estimators. The requirements set out in A1–A5 are strict; in practical econometric work, where optimal solutions are not always available, research design often will have to resort to a best-possible criterion. Accuracy of data will have to be weighed against the need to increase the number of observations; methodology must be workable yet meet scientific standards. This is especially true in cross-country growth regressions, where the number of observations is limited. In the empirical part of this paper, I will use OLS as a starting point and subsequently analyse the error terms to test whether assumptions A1 to A5

[20] Analyses undertaken using Stata 7.0. The dataset and accompanying command files are available from the author upon request.

are fulfilled. On that basis we can identify potential weaknesses in the results and perhaps take measures to improve the regressions.

The dependent variable is economic growth, and the regression will try to identify factors that can explain why growth varies across countries. There is a vast literature that employs this methodology to look at a broad range of issues, and the technique is often identified with Robert J. Barro. However, there is no theoretical consensus framework to guide empirical work on growth, argue Levine and Renelt (1992), who also present a recognised evaluation of the effectiveness and reliability of cross-country growth regressions in general. They assert that the lack of methodological consensus has led to eclecticism, in the sense that researchers often highlight the particular variables relevant for the question they are investigating, while failing to control for other factors analysed by other papers. This eclecticism may undermine the econometric soundness of research results, particularly since 'almost all identified relationships are very sensitive to slight alterations in the conditioning set of variables, and many publicised coefficients change sign with small changes in the conditioning set of variables', as Levine and Renelt (1992: 943) claim. The article goes on to analyse the robustness of econometric results using the specification:

(E7.1) $Y = \beta_i I + \beta_m M + \beta_z Z + u$

Here, Y indicates the annual per capita GDP growth rate, I is a vector of variables always included in the regressions, M is the particular variable of interest and Z is a subset of a broader pool that in previous studies have been found to be correlated with growth. More than 50 factors are considered in total. To limit the effect of multi-colinearity, they limit the number of variables in each specification to eight or fewer. The analysis gives support to their assertion about coefficient sensitivity and fragility of results, leading them to propose the following econometric maxim: 'We consider the relationship between growth and a particular variable of interest to be robust if it remains statistically significant and of the theoretically predicted sign when the conditioning set of variables in the regression changes' (Levine and Renelt, 1992: 943). In their analysis, the share of investment in GDP is the sole factor that meets the strict criterion the authors themselves put forward. While some researchers consider this maxim to be overly rigorous, arguing that statistical significance is in many instances enough to give valuable insights, Levine and Renelt have provided an important mental note on the potential limitations of cross-country regressions.

7.2 Data material and selection of variables

The selection of data is crucial in any regression analysis. In this section I explain and justify the choices made in compiling a dataset from various sources. As economic growth is the dependent variable, the selected time period and data will shape the rest of the analysis. Some of the best-known contributions on trade and economic growth, such as Sachs and Warner (1995), Edwards (1998) or Rodrik and Rodriguez (2001), use measures of economic growth that cover relatively long time periods (15–30 years). This

is motivated by a desire to isolate the specific effects that trade has on economic growth, and isolate the influence of other factors. Both business-cycle effects and shocks that hit the world economy asymmetrically are assumed be smoothed out in the course of such a time span. More specifically related to trade, the time span is also considered to neglect the mere *level* effects of for instance a one-shot trade liberalisation on GDP, as predicted by static trade theory, thus allowing a cleaner focus on the effect of trade on long-term steady-state economic growth. Sachs and Warner (1995) look at the time period 1965–1990. Writing ten years later, I have chosen the time period 1975–2000, motivated not only by a desire for more recent data, but also by data availability. In the World Development Indicators published by the World Bank (2004), the starting and closing years of the chosen period are watersheds: Prior to 1975, data are simply not available for many countries; after 2000, data for several countries have not yet been reported and made available. This yields a dataset of 94 countries, using PPP per capita data measured in 1995 international dollars (for country list, see Appendix C).

A requirement for undertaking OLS regression analysis is that the conditioning variables – such as indicators of e.g. investment, trade and human capital – are independent of, or exogenous to, the dependent variable. Specifically, in this case there should be no feedback from economic growth to any of the independent variables included in the analysis. If this requirement is not satisfied, assumption A3 is violated and the estimators will become biased. Imagining examples where economic growth may give feedback to independent variables is rather straightforward: It is for instance not unreasonable to expect that a larger GDP can increase the government resources that can be channelled into education, thereby increasing human capital. One way to improve the exogeneity of the set of conditioning variables would be to select data that in time precede the growth period of the dependent variable. Doing so, however, might compromise the relevance of our results. The investment rate, measured as a percentage of GDP, is known to fluctuate, for instance. If it were significantly different in the middle of the growth period than in the preceding years, that would be likely to affect growth in towards the end of the period. If it has a significant effect on growth, then excluding the middle observation will imply that the investment coefficient becomes less representative of the actual effect of investments on growth. In selecting the data, one is therefore faced with a dilemma between data exogeneity and data relevance.

In the empirical growth literature, there is no clear consensus as to how this dilemma should be resolved. However, there is a rationale in choosing pre-period values for variables that are not likely to exhibit unexpected changes in the period, nor likely to be directly affected by economic growth. For variables that do not fall within these two criteria, it is common to employ the period arithmetic average. The latter method also increases data availability, since the mean can be calculated without having values for all the years in question. Here I follow the selection principles of Sachs and Warner (1995). This implies that for instance life expectancy, population size and human capital indicators take pre-period values. On the other hand, variables like investments, trade measures, and institutional

indicators are averaged over the time period. The time selection of each variable will be shown by its name.

Although Levine and Renelt (1992) argue that there is no consensus around a theoretical framework for growth regressions, they nevertheless point to a minimum set of variables that – based on economic theory and previous studies – are commonly included in the regressions. These variables constitute the *I*-vector they use as a base set of conditioning variables, and include: investment share of GDP, initial GDP per capita to control for convergence,[21] a human capital measure and population growth (ibid: 945). They argue that few studies use all of these variables, but most control for a subset. Sticking to this principle, and in accordance with the standard research tradition, I will also use a subset of these variables. The subset will be integrated into the conditioning variables when checking the robustness of the results. Because growth in GDP/ per capita is the dependent variable in my regression, a partial conditioning of population growth is already built into the analysis. However, population growth may in itself influence per capita income.

The data come from various sources, the two main ones being the World Development Indicators from the World Bank (2004) and institutional time-series data from the International Country Risk Guide, available from Political Risk Services (2005). Furthermore, I have employed a time series of tariff data available from Gwartney and Lawson (2005) at the Fraser Institute.[22] For a detailed description of the dataset employed, including sources for each variable, readers are referred to Appendix A.

7.3 Indicators of openness

There can be many determinants of trade: geography, resources, population, purchasing power and trade policy are among the factors that influence the quantity of a particular country's imports and exports. As economic researchers, we are interested not only in understanding the interplay between trade and economic development in general, but also in gaining the specific insights into how trade *policy* will influence the economy that can enable us to give specific advice on how to achieve economic growth. In an experimental world where all variables in the name of science smoothly adjust to authoritative commands, we would produce a set of economies that were identical in all respects except trade policy. In the scientifically imperfect world of the social sciences, however, isolating the effects of a single variable is a far more complicated affair. As the overview of the

[21] A negative coefficient for initial GDP is a necessary, but not a sufficient, condition for convergence. To establish convergence, there must also be a decrease over time in the standard deviation of growth rates (also known as sigma convergence).

[22] The Fraser Institute is an independent Canadian economic, social research and educational foundation. It describes itself as dedicated to enhancing the quality of life by researching the role of competitive markets, lower taxes and less regulation. It is a private non-profit foundation, financed by private contributions. The institute's website is www.fraserinstitute.ca.

existing literature on openness and growth has shown, endogeneity problems or omitted variable bias can be potential weaknesses.

Pritchett (1996) has surveyed possible indicators of openness and categorised them into incidence-based or outcome-based indicators. The former is based on observed trade policy measures such as quotas and NTBs, whereas the latter tries to deduce levels of protection based on observed trade and price patterns. Both have strong and weak aspects. Broadly speaking, incidence indicators have the advantage of being directly observable. However, protection can be imposed through such a myriad of restrictions (quotas, licensing, physio-sanitary demands) and taxes (tariffs, administrative fees) that making cross-national comparisons is in practice very difficult. Outcome-based indicators are more easily quantifiable, but are not directly and without qualification very informative about actual levels of protection in an economy. Pritchett analyses several different objective trade policy measures and finds that they are completely uncorrelated across countries. He therefore takes a rather pessimistic view on the possibility of finding a consistent and informative indicator of openness, particularly with respect to the least developed countries (LDCs). As I see it, this uncertainty has two main implications. First, it indicates that researchers will have to settle for openness measures that are the best possible ones – but not necessarily optimal – and be correspondingly careful when interpreting results. Second, it offers a strong argument that an indicator cannot be rejected merely because some observations may seem oddly classified. Indeed, Pritchett finds that all of the considered indicators gave controversial classifications to at least a few countries.

In the following, I will try to find an operational indicator for openness based on these remarks and the suggestions in the literature review. I start with Dollar (1992), who used the deviations from US prices on tradable goods as an openness measure, arguing that the law of one price would equalise price levels under free trade. However, as Rodrik and Rodriguez (2001) (RR) have pointed out, several studies have evinced only weak empirical support for the law of one price. The price deviations indicator is therefore no longer frequently employed. Ben-David's (1993) work on convergence does not employ an openness indicator, and is as such not helpful in choosing one.

Sachs and Warner (1995) (SW) make a very important point in arguing that the inward orientation of an economy can come from various sources: import restrictions in many forms, export restrictions and exchange rate instability. As such, there is a solid rationale for their utilisation of an openness indicator that incorporates several of these sources. One difficulty with the dichotomous indicator that SW employ lies in distinguishing open economies from moderately closed economies: an economy with an average tariff of 39% and 39% of trade covered by NTBs will be classified as just as 'open' as a country with completely free trade. However, the fundamental challenge with the SW indicator is that its strength derives mainly from factors that are linked to macroeconomic mismanagement, which in itself has a detrimental effect on growth. It can therefore be difficult to distinguish the effects of trade policy proper. The RR critique and subsequent work of Wacziarg and Welch (2003) has led to a reinterpretation of the SW

coefficient. A positive view would argue that the indicator represents a broad set of outward-oriented policy measures in general, whereas a less optimistic view would see the measure as merely indicating poor macroeconomic management. Both interpretations could prove useful in many circumstances. In our context, however, the focus is on the possible growth effects of trade policy, so I prefer to search for a more precise indicator.

Tariffs and quotas are generally considered to be the main instruments of trade policy. A direct openness indicator may be to use tariff rates, or a measure of non-tariff barriers, directly in the regression equation. Of the studies reviewed above, only Edwards (1998) uses these direct measures of trade policy. The literature is divided as to how representative direct measures of trade policy are of the actual level of protection. Rodrik and Rodriguez are strong advocates of using tariff averages or coverage ratios for NTBs because these are the most direct measures of trade policy available: 'We know of no papers that document the existence of serious biases in these direct indicators, much less establish that an alternative indicator 'performs' better (in the relevant sense of calibrating the restrictiveness of trade regimes)' (RR, 2001: 60). On the other side, Dollar and Kraay (2003: 148–50), who argue that direct indicators often are uninformative about actual trade policy, give country-specific examples and cite liberalisation episodes where indicator values remained largely unchanged. They also argue that tariff reductions are weakly linked to increased trade volumes. While these objections remain valid and may cause misclassification of some economies, Pritchett (1996) finds that all openness measures will cause misclassification of some outliers. An indicator cannot be rejected on such grounds alone.

The next question then becomes which direct trade indicators are most representative of actual protective levels. Dollar and Kraay (2003) raise an important point about NTB measures that typically represent the fraction of tariff lines covered by some non-tariff restriction: The coverage ratio reveals little about the nature, severity and the effect of the actual restrictions in place. As such, the tariff rates are more informative. Furthermore, time-series data are more complete for tariffs than NTBs.[23] Tariff rates can be reported by either a simple or a weighted average. The former method risks giving influence to goods categories that are relatively unimportant to a country, whereas the latter method overlooks the potential effects of prohibitive tariffs.

These considerations support using the tariff rate as a measure of openness. I will further use a simple, unweighted average, since that offers better coverage of time-series data. The tariff time-series data compiled as an index by the Frasier Institute are based on data from the annual World Development Reports.[24] A first look at how this index indicator correlates

[23] Barro and Lee, 1994, provide NTB data for around 60 of the countries included in my analysis, but only a single-point observation dated between 1985 and 1989.

[24] The index is based on the World Development Indicator labelled 'simple mean tariff' (personal correspondence with author Robert A. Lawson). The World Development Indicators (2004: 325) define this variable as 'the unweighted average of effectively applied rates or most favoured nation rates for all products subject to tariffs calculated on all traded goods'.

with growth is found in Figure 7.1, generated from the data I have compiled. Tariff rates are indicated by an index that ranges from 0 to 10. Higher index values indicate higher tariffs, with a negative impact on growth.

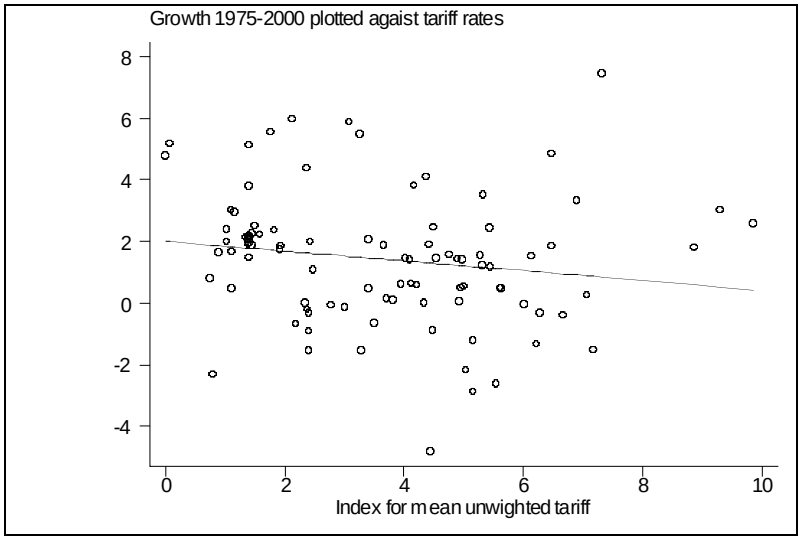

Figure 7.1: Growth and tariff rates

7.4 Institutional indicators

As discussed in Chapter 5, the most common method of quantitatively assessing institutional performance is to use governance indicators or indices. Some rely fully or in part on subjective ratings developed by scholars, investors, or officials, while others integrate more objective measures (e.g. the official homicide rate) to proxy for institutional quality. The range of institutional aspects considered is wide and may include the rule of law, quality of bureaucracy, democratic participation, trust in political leaders, corruption, and internal and external conflict. In the quantitative literature, studies include multiple aspects either in separate control variables or combined as an integrated institutional measure.

A World Bank (2005) paper[25] surveys existing institutional indicators, seeking to assess how they differ with respect to aspects considered, specificity, data coverage across countries and time, method, data quality and accuracy, and the use of data in published studies. The study argues that indicators are likely to differ sizeably with respect to quality and accuracy, and therefore points to some principles in choosing indicators. First, aggregating several aspects in a joint indicator is likely to improve quality. Second, accuracy may increase with the number of respondents who contribute. Third, an indicator is seen to be more reliable when marketed, since paying subscribers give incentives for accuracy. Fourth, strong

[25] The survey is available online and seems to originally have been written in 2001. It has been updated at least twice since then, most recently in 2005.

interests or ideology on the part of those publishing the data may weaken reliability. Fifth, indicators that have been available for long periods or used in published research papers are seen to be more accurate, because they have been challenged and improved over time.

From an overall assessment, I have chosen the International Country Risk Guide (ICRG) from Political Risk Services (2005) as my institutional indicator. The ICRG is based on an aggregate of several measures, available only to paying subscribers, published by a consultancy firm for use by multinational firms and has been available for over two decades. However, relatively few experts are involved in rating. It therefore meets four of the five criteria outlined above. Two additional factors were decisive. As one of the longest time series available, the ICRG is has very good availability across countries and time periods. Also, among the 13 indicators surveyed, the ICRG is one of only two that get the top score for use in published studies.[26] In sum, I consider the ICRG the best available option.

The ICRG was created in 1980 by the editors of the weekly newsletter *International Reports*, but is now published by a private consultancy, the PRS Group. The published rating consists of 22 variables in three subcategories: political, financial, and economic risk. The governance indicators are found in the political risk section, and contain 12 components that are weighted to form a maximum total score of 100 points, where more points indicate better governance. ICRG (2005) describe the scores as being assigned on a subjective but consistent basis along specific criteria more closely described in the guide that accompanies the data. The ICRG guide underlines that the framework permits a flexible approach to rating governance: 'One advantage of the ICRG model is that it allows users to make their own risk assessments based on the ICRG model or to modify the model to meet their specific requirements. […] Composite risk ratings can be recalculated by giving greater weight to those [requirements].' (Political Risk Services 2005: 27).

I have chosen to take advantage of the flexibility inherent in the ICRG framework by selecting the components that are the most relevant in estimating the institutions of conflict management. These include internal conflict, religion in politics, ethnic tensions, democratic accountability, quality of bureaucracy, and account for 34% of the full ICRG index. Governance factors more peripheral to the theory to be tested (e.g. investment profile and military in politics) are thus not included. The score on the relevant characteristics is then recalculated to a scale ranging from 0 to 10 – where higher values indicate better institutions – that will be included as my institutional measure in the empirical analysis below.

7.5 Openness, institutions and growth – an analysis

We have already seen that trade barriers as measured by the average tariff rate have a significant and substantially negative effect on growth. But do

[26] The Freedom House democracy index gets the other top score, but is less relevant in this context because it focuses exclusively on democratic participation. The ICRG includes measures of government quality, in addition to democracy.

trade barriers have different effects on growth in countries with a good institutional environment versus countries with poorly developed institutions? To analyse this, I introduce an interaction variable, defined as follows:

(E7.2) $INTERACTION_i = INSTITUTION8400_i * TARIFF7500_i$

Subsequently, regressions are undertaken. Since Levine and Renelt (1992) find investments to be the most robust variable affecting growth, LNINV7500 is controlled for in all regressions. I then add the institutional indicator INSTITUTION8400 in regression two (R2) and the interaction variable INTERACTION in R3. In R4 and R5, the most standard controls (Levine and Renelt's *I*-vector) are introduced by adding LGDP75 for convergence and LNLIFE75 as a measure of human capital. In R6–R8, continental dummies are introduced. Results are shown in Table 7.1.

	R1	R2	R3	R4	R5	R6	R7	R8
LNINV7500	5.12*** (0.72)	4.62*** (0.69)	4.73*** (0.68)	4.54*** (0.66)	2.90*** (0.62)	2.61*** (0.63)	2.63*** (0.62)	2.40*** (0.64)
TARIFF7500	-0.23 (0.08)	0.16* (0.09)	0.71** (0.35)	0.63* (0.34)	0.48* (0.28)	0.35 (0.29)	0.29 (0.29)	0.34 (0.28)
INSTITUTION		0.42*** (0.12)	0.66*** (0.18)	0.91*** (0.20)	0.64*** (0.17)	0.69*** (0.17)	0.47** (0.18)	0.68*** (0.17)
INTERACTION			-0.09* (0.05)	-0.09* (0.05)	-0.09** (0.04)	-0.07* (0.04)	-0.05 (0.04)	-0.06 (0,04)
LGDP75				-0.73*** (0.25)	-1.74*** (0.27)	-1.83*** (0.27)	-1.71*** (0.27)	-1.68*** (0.27)
LNLIFE75					8.43*** (1.39)	6.44*** (1.70)	9.35*** (1.42)	7.89*** (1.37)
SSAFRICA						-1.07** (0.54)		
LATINAM							-0.82** (0.36)	
ASIA								0.88** (0.36)
N	94	94	94	94	94	94	94	94
Adjusted R2	0.36	0.44	0.45	0.49	0.64	0.65	0.65	0.66

*Table 7.1. Regression results with standard errors reported in parentheses. *, ** and *** indicate significance at respectively 10, 5 and 1 percent levels. GROWTH7500 is the dependent variable.*

	TARIFF7500	INSTITUTION8400	INTERACTION
TARIFF500	1		
INSTITUTION8400	-0.57	1	
INTERACTION	0.91	-0.26	1

Table 7.2: Correlation matrix for selected variables

We see that the INTERACTION effect does enter significantly, and that the implication of TARIFF7500 varies with the institutional environment: high tariffs act to reduce growth only if institutions are well developed.

The specific implications will be spelled out in greater detail below, but first some comments on the specific regressions are in order. Going from R1 to R2 changes the sign of TARIFF7500, indicating that R1 suffers from omitted variable bias because of the exclusion of a variable that is negatively correlated with the tariff level. INSTITUTION8400 has indeed such a negative correlation, as Table 7.2 shows. R2 arguably atones for some of the bias, but the coefficient is still not significant. When the INTERACTION variable is added in R3, however, TARIFF7500 enters significantly at the 5% level with a boost in the coefficient value. The INTERACTION variable also enters significantly, with an even higher absolute value. The inclusion of the interaction variable improves both the significance and the fit of the specification. Although TARIFF7500 on average has a negative effect on growth, it does seem that this is mediated by the institutional environment. While both TARIFF7500 and INTERACTION keep signs and magnitudes in R6–R8, neither is completely robust to the inclusion of continental dummies.

If these results are representative, they imply that the effect of openness depends largely on the institutional quality of each country. Keeping all other factors constant, let us now consider some of the specific implications by looking at the effect a change in openness will have on growth. An expression for the marginal effect of a unit increase in the tariff index for each observation can be found by taking the derivative of GROWTH7500 with respect to TARIFF7500, and inserting the fitted coefficients from R5:

$$\text{(E7.3)}\quad \frac{dGROWTH7500_i}{dTARIFF7500_i} = 0.48 - 0.09 * INSTITUTION7500_i$$

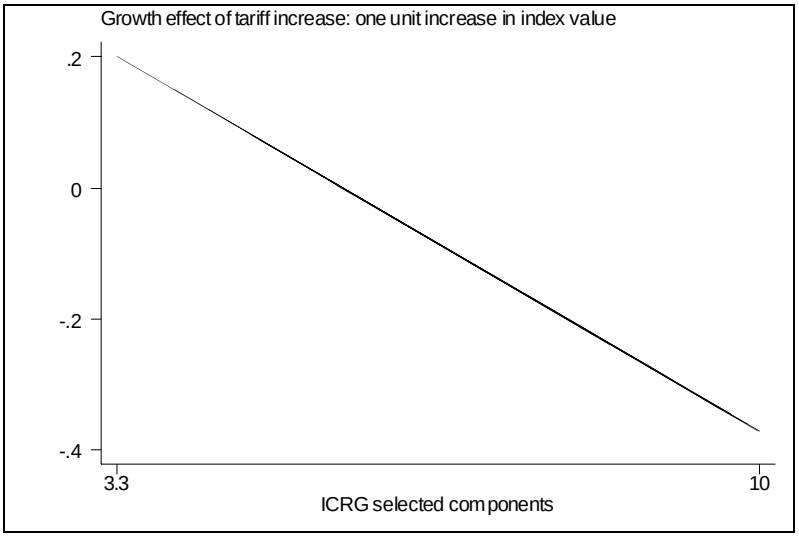

Figure 7.2: When the tariff level is raised by a unit increase in the TARIFF7500 index value, the effect on growth will depend on the level of institutional development.

In equation E7.3, a marginal change in openness will, *ceteris paribus*, have no effect on growth when INSTITUTION8400 is at 5.33. Above that threshold of institutional development, openness will have a positive effect on growth. If equation E7.3 is taken literally, it implies that below the specified level, tariffs have a negative effect on growth (see Figure 7.2).

In the sample of 94 countries, only 25 have a level of institutional development where a tariff increase has a positive effect on growth. For the remaining 69 observations, tariffs have a negative impact on growth. These results are illustrated by the histogram Figure 7.3. The distribution is skewed to the right, and there is a peak at the bottom for the set of ten countries with the least developed institutions.

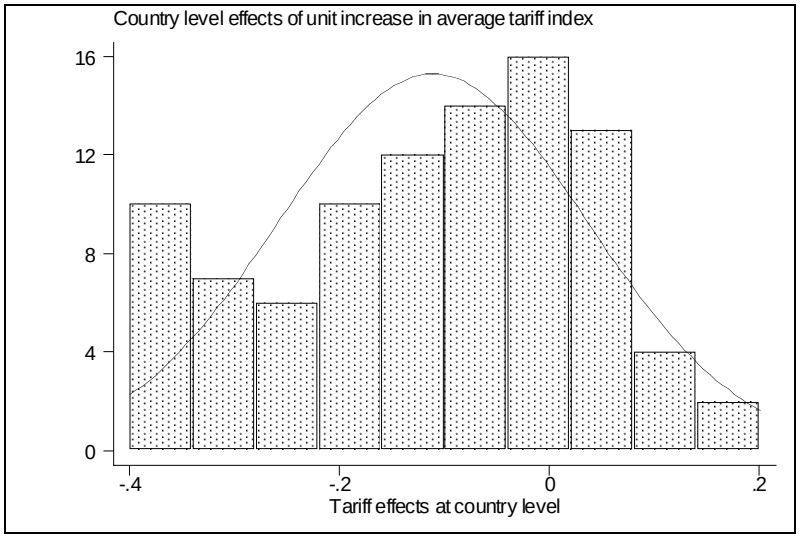

Figure 7.3: Based on regression R5, the histogram illustrates the marginal effects of a unit increase TARIFF7500 on growth for a sample of 94 countries. The spread is due to cross-country differences in institutional quality.

7.6 Robustness checks

The robustness of these results can be checked by several means. The first is to perform standard analysis of the error terms to verify that none of the assumptions A1–A5 of OLS analysis are violated, as is done in Appendix B to this paper. This analysis indicates that OLS gives an appropriate estimator in the specified regressions. A second robustness test would be to look more closely at the variables used. The choice of tariffs indicator is of particular interest due to the ongoing discussion in the literature on how trade openness should best be measured. As this was a main objection raised by Dollar and Kraay (2003), I would argue that the most relevant test of an openness variable would be to check whether it correctly predicts trade flows. That could be done by the following regression specification:

(E7.4) $TRADESHARE7500_i = \tau_0 + \tau_1 TARIFF7500_i + Z_i\tau + \varepsilon_i$

Z represents a vector of control variables. Theory suggests that country size (measured by population), income level, growth rate, and continental dummies to control for qualitative factors should be included in the list of controls. For the independent variables, in parallel to the growth regression above, there is a dilemma between endogeneity and relevance. Here relevance is given weight, because it is not unreasonable to expect that the trade share would reflect changes in the independent variables within a relatively short period of time. Regression results are shown in Table 7.4.

	R9	R10	R11	R12	R13
TARIFF7500	-6.48*** (1.75)	-5.44*** (1.82)	-7.04*** (2.37)	-5.55** (2.26)	-4.90** (2.45)
POPULATION75		-0.06* (0.03)	-0.06* (0.03)	-0.11*** (0.03)	-0.12*** (0.04)
LGDP75			-5.03 (4.83)	-5.76 (4.53)	-1.54 (6.38)
GROWTH7500				6.72*** (1.83)	7.18*** (2.27)
SSAFRICA					12.6 (16.2)
LATINAMERICA					2.17 (11.29)
ASIA					14.13 (11.4)
N	93	93	93	93	93
Adjusted R2	0.12	0.14	0.14	0.25	0.24

*Table 7.4 Regression results with standard errors reported in parentheses. *, ** and *** indicate significance at respectively 10, 5 and 1 percent levels. TRADESH7500 is the dependent variable.*

The results show that the tariffs enter with a strong and statistically significant impact, regardless of the list of controls. These results seem to indicate that tariffs are a satisfactory and relevant measure of trade openness.

Not withstanding or denying the relevance of tariffs as a measure of openness, results could be made even more robust if multiple measures of openness were included in the analysis. An instrumental variable for the trade share in GDP, using Frankel and Romer's (1999) approach in constructing a geography-based gravity model, is one possible candidate. Data for NTB coverage is another. The raw material for these measures is to some extent available, but the work required to construct end-indicators is probably beyond the scope of this paper. It would also be desirable to use multiple institutional indicators. These are more readily available, but with N openness measures and M institutional indicators, there are in principle M*N possible interaction variables that can be employed. While such contributions could be very interesting, they are again arguably beyond the scope of my analysis. The intention here is not to provide an exhaustive

empirical analysis of the hypothesis at hand, but simply to identify some linkages that may have been overlooked in the empirical literature.

Another possible caveat concerns determining the exact cause of the interaction effect between institutions and openness that is revealed in the analysis. The present hypothesis argues that good institutions of conflict management are needed to respond effectively to the external shocks that follow from openness. But there are competing theories, as discussed in Chapter 6. One such theory is that good institutions enable countries to use activist tariff policy to promote an industrial development that enhances growth. The interaction effect between openness and institutions would then be negative. The empirical analysis finds a positive interaction effect, and therefore does not support the latter theory.[27] Instead, the results lend support to the main hypothesis in this paper, putting emphasis on the institutional capacity to act in response to external shocks. This could be taken to indicate that good institutions of conflict management are more important for open economies than for those with protectionist policies. Nevertheless, the analysis here has not provided a framework for determining the *exact channel* of the interaction effect. My hypothesis proposes that capacity to respond to external shocks accounts for the interaction effect, but the web of causality is complex, and I cannot exclude the possibility that it has a different origin. Empirical results do not necessarily map into unique theoretical forms, so further research is needed to fully understand the interplay between openness, institutions and growth.

[27] On the other hand, the alternative theory cannot be rejected outright, because the institutions that foster conflict management may not be the same institutions that promote well-functioning protectionist policies. Only institutions of conflict management are integrated in the empirical analysis.

'Perhaps most difficult of all, economists will have to learn to be more humble!'

Dani Rodrik (2002, 3)

8. Conclusion

This paper has investigated the relationship between economic openness, institutions and growth. Specifically, the working hypothesis has been that good institutions of conflict management are necessary if one is to reap the full growth benefits of openness. Chapter 3 shows that existing trade and growth models have ambiguous theoretical predictions for the effect of openness on growth, implying that the relationship must ultimately be determined empirically. The empirical literature is surveyed in Chapter 4, and shows that a clear and robust connection between openness and growth has yet to be established. Although most studies find a positive relationship on average, there is considerable unexplained variation in the data. In Chapter 6, I proposed that some of the heterogeneity may be explained by considering a country's institutions of conflict management. On the assumption that openness is accompanied by increased exposure to external shocks that can spur domestic conflict, I developed a model proposing a positive interaction effect between openness and institutions: Having strong institutions of conflict management means that countries can adjust adequately to shocks and benefit from openness; by contrast, weak institutions that fail to respond can stifle growth and generate further long-term losses for the economy.

In Chapter 7, I proposed using tariff rates and selected components of the ICRG index as operational definitions of openness and institutions of conflict management, respectively. The empirical analysis found a positive and statistically significant interaction effect between openness (low tariffs) and institutions. In fact, the results indicate that for the 25 sampled countries with the poorest institutions, a *ceteris paribus* lowering of tariffs would actually lower the growth rates of these economies. However, the results of the empirical analysis do not necessarily imply that those countries should rush to close their borders. First, caution should be taken in interpreting cross-national data, especially when the regressions are not completely robust to changes in the list of control variables. More research is needed before any final conclusions can be drawn. Second, trade reforms are usually accompanied by other reforms and are rarely carried out in a *ceteris paribus* setting. Hence, if combined with institutional improvements, trade liberalisation carries the potential of a twofold gain. It can also be argued that trade reform in itself can be used to promote the institutional environment (see for instance Rodrik and Rigobon, 2004; Rodrik, 2000). Third, trade may be essential for economic growth in countries with poorly developed institutions even though complete trade liberalisation in the current institutional environment may not. In fact, exchanges of goods and services with the outside world can be an important ingredient in any development strategy.

These reservations notwithstanding, the empirical analysis *does* show that trade policies work differently in different institutional contexts.

Policymakers who seek to promote economic growth with scarce administrative resources must therefore ask themselves what the key priorities should be. The results could serve as a warning against the notion that trade liberalisation should be a universal policy recommendation for growth: The same medicine may not do all patients equally good. That may be an argument for taking country-specific considerations into account when designing trade policy. Perhaps more importantly, the findings may indicate that, for countries with weak institutions of conflict management, trade liberalisation may not be the most important contribution to a development strategy. As such, the results may lend support to those researchers who argue that strong institutions are more important for long-term growth than outward orientation. The analysis may also help to explain why many studies (for instance Wacziarg and Welch, 2003) have found the effects of liberalisation to be very heterogeneous.

The findings are in line with the results presented by Chang, Kaltini and Loayza (2005), another study that looks at the interplay between openness and other variables. Even with the use of the trade share in GDP as a measure of openness, they find that the interaction effect with institutions is positive. Chang et al. therefore emphasise that there is a role for policy complementarities in designing trade policies: 'One policy implication of our analysis is that the advisability of trade liberalisation may depend on the existence and degree of distortions in non-trade institutions […] This underscores the need to reject a 'one size fits all' approach to trade opening in favor of packages that are tailored to the specific circumstances of each country' (2005: 27).

In conclusion, good institutions of conflict management seem necessary to reap the full benefits of integration into global markets. Benefits could follow from taking a comprehensive approach to trade policy design, taking into consideration both the current status and enhancement potential in institutional quality. The exact steps that lead to such improvement, however, have not been clearly defined in the literature. Desired mechanisms such as conflict management can be achieved through various types of institutional arrangements, with possible room for country-specific adjustments. The general message to policymakers is therefore that institutions of conflict management should be given priority, and that further research is needed before specific policy implications can be spelled out.

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Appendix A: Description of variables

Variable name	Description	Source	Notes
ASIA	Dummy that takes the value 1 if a country is in Asia.	WDI (2004)	Based on WDI definitions, the dummy consists of regions 'South Asia', 'East Asia and Pacific' and non-African countries in 'Middle East and North Africa'
GDP00	GDP per capita in 2000 – measured in constant 1995 int $ PPP units	WDI (2004)	
GDP75	GDP per capita in 1975 – measured in constant 1995 int $ PPP units	WDI (2004)	
GROWTH7500	Economic growth 1975–2000. Formula: GROWTH7500=100*(1/25)*ln(GDP00/GDP75)	-	
INSTITUTION 8400	Institutional variable that measures the quality of a country's conflict management institutions. Based on selected components from the International Country Risk Guide (2005) governance indicators (table 3B). The following components are selected: conflict, religion in politics, ethnic tensions, democratic accountability, and quality of bureaucracy.	ICRG (2005)	The index is transformed to a 1–10 scale, where higher scores represent higher quality of institutions.
INTERACTION	Interaction variable between openness and institutions. Calculated as follows: INTERACTION= INSTITUTION8400*TARIFF7500	-	
LATINAM	Dummy that takes the value 1 if a country is in Latin America	WDI (2004)	Consists of region 'Latin America and Caribbean' from WDI definitions.
LGDP75	Natural logarithm of GDP75.	-	
LNINV7500	Natural logarithm of investments measured as a percentage of GDP, averaged over period 1975–2000.	WDI (2004)	
LNLIFE75	Natural logarithm of average life expectancy in 1975. Common proxy for human capital in the literature.	WDI (2004)	1982 data used for Jordan.
POP75	Population in 1975, measured in million inhabitants.	WDI (2004)	
SSAFRICA	Dummy that takes the value 1 if a country is in Sub-Saharan Africa	WDI (2004)	Consists of region 'Sub-Saharan Africa' from WDI definitions.
TARIFF7500	Mean unweighted tariff rate, averaged over period 1975–2000. Data reported to be compiled from several sources (WTO, UNCTAD, World Bank). Primary indicator	Fraser Institute (2005)	Source data employ an index from 1–10, where 10 represents the lowest tariffs. I have reversed the

	seems to be the 'simple mean tariff' variable from the annual World Development Indicators from the World Bank.		scale so that 1 represents the highest tariffs.
TRADESH7500	Imports+Exports / GDP – averaged over the period 1975–2000.	WDI (2004)	

Table A.1. Variable descriptions with notes and sources. Although data availability is generally good, full tim- series data are not available for a small group of countries. For the variables TARIFF7500, TRADESH7500, LNINV7500, and INSTITUTION8400, simple averages were calculated from available data points. Sources: WDI refers to the World Development Indicators from the World Bank (2004), Fraser Institute to Gwartney and Lawson (2005), and ICRG to International Country Risk Guide from Political Risk Services (2005).

Variable	N	Mean	Std.Dev.	Min	Max
ASIA	94	0.21	0.41	0.00	1.00
GDP00	94	10334.84	10169.94	426.66	51636.82
GDP75	94	6348.92	5771.09	472.91	25842.39
GROWTH7500	94	1.42	2.11	-4.82	7.44
INSTITUTION8400	94	6.94	1.73	3.30	10.00
INTERACTION	94	23.15	12.24	0.00	53.69
LATINAM	94	0.23	0.43	0.00	1.00
LGDP75	94	8.30	1.02	6.16	10.16
INV7500	94	22.79	5.39	9.61	38.70
LNINV7500	94	3.10	0.25	2.26	3.66
LIFE75	94	61.07	10.79	35.08	75.50
LNLIFE75	94	4.10	0.19	3.56	4.32
POP75	94	35.86	115.16	0.19	916.40
SSAFRICA	94	0.21	0.41	0.00	1.00
TARIFF7500	94	3.64	2.16	0.00	9.86
TRADESH7500	93	68.65	38.35	16.63	227.11

Table A2. Statistical descriptions of variables

Appendix B: Testing the OLS assumptions

If the assumptions A1–A5 outlined in Chapter 7 are not fulfilled, OLS may be an inappropriate estimator. I have therefore performed some standard tests to ensure the validity of these assumptions. This appendix shows test results mainly for regression R5, the most important specification in my analysis. From the following results, I do not find evidence to suggest that OLS is an inappropriate estimator in the context of this paper.

First, a regression specification error test (RESET) has been used to control the adequacy of the model. One version of RESET from Hill et al. (2001, 187) implies integrating the squares of the predicted values from R5 as independent variables in the original equation, giving this specification:

(A.1) $Y_i = \beta_0 + Z\beta + \beta_1 \hat{Y}_i^2 + \varepsilon_i$

Y represents GROWTH7500 and *Z* a vector of the independent variables in R5. If the coefficient β_1 is significantly different from zero, this may indicate that the specification is inadequate. In the case of R5, β_1 takes the value –0.036, with a standard error of 0.031 and p-value of 0.25. At conventional levels of significance, the test is therefore not able to detect any misspecification.

Second, I have investigated the joint significance of the independent variables with an F-test. Results show significance at the 1% level for R5 (and all regressions R1–R13), indicating that the models do have overall explanatory power.

Third, I have looked at the distribution of the residuals in R5. If the expected value of the error term is different from zero or if the errors are not normally distributed, the OLS estimator will be biased. For large samples (N>50), however, the estimator remains consistent even if the errors are non-normally distributed. Figure A.1 gives statistical information about the error terms and shows visually that the error terms are fairly normally distributed, although there seems to be some presence of fat tails in the distribution. A skewness and kurtosis test is not significant at conventional levels, and does not give grounds for rejecting the assumption that the errors are normally distributed.

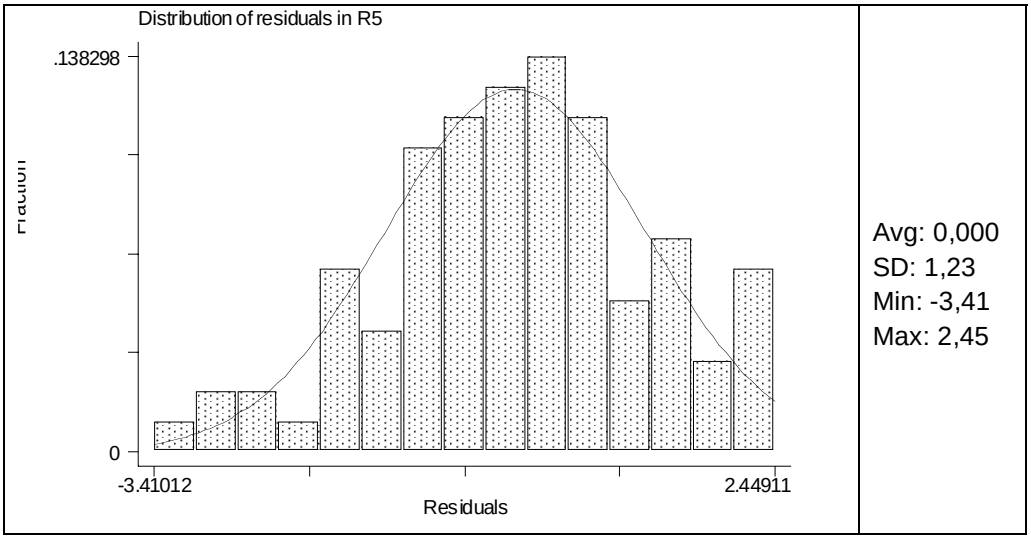

Figure B.1: Distribution of residuals in regression R5

Fourth, heteroskedasticity in the error terms will imply that the OLS estimator becomes inefficient, and, more dramatically, that the variance of the coefficients is wrongly estimated. Then t-test cannot be carried out and inferences cannot be drawn from the estimates. The White test for heteroskedasticity (Kennedy, 2003: 138) examines whether the variance in the error terms can be explained by either the independent variables, their squares or their cross-products. When conducted on R5, neither the F-test nor t-tests for any of the variables are significant at conventional levels. The White test then suggests that the assumption of homoskedastic errors cannot be rejected. This assumption is further supported by regressions carried out using White's robust standard errors on all specifications R1–R13. The robust regressions change t-values only by small levels, and in no consistent direction; moreover, no variables change significance at the 10 % level. Finally, scatterplots between the error term and each of the independent variables are shown in Figure B.2. Visual inspection shows that none of the graphs indicates a clear relationship, so we find no grounds for rejecting the assumption of homoskedastic errors.

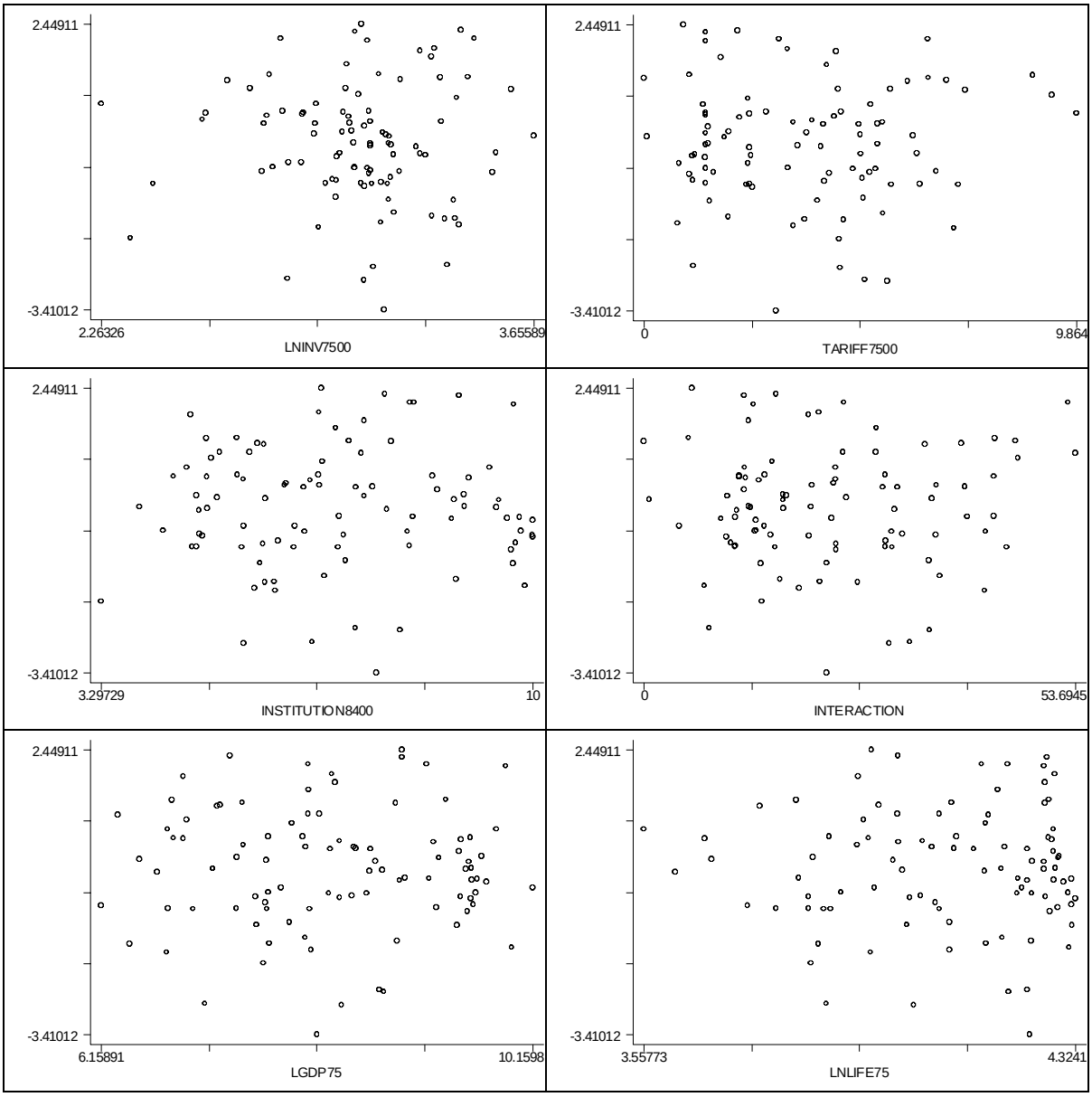

Figure B.2: Scatter plots showing residuals and each of the independent variables in regression R5

Appendix C: Sample of countries

Algeria
Argentina
Australia
Austria
Bahamas
Bangladesh
Belgium
Bolivia
Botswana
Brazil
Cameroon
Canada
Chile
China
Colombia
Congo, Dem. Rep.
Congo, Rep.
Costa Rica
Cote d'Ivoire
Cyprus
Denmark
Dominican Republic
Ecuador
Egypt
El Salvador
Finland
France
Gabon
Germany
Ghana
Greece
Guatemala
Guinea-Bissau
Guyana
Haiti
Honduras
Hong Kong (China)
Hungary
Iceland
India
Indonesia
Iran
Ireland
Israel
Italy
Jamaica
Japan
Jordan
Kenya
Korea, Rep. (South)
Kuwait
Latvia
Luxembourg
Madagascar
Malawi
Malaysia
Mali
Malta
Mexico
Morocco
Netherlands
New Zealand
Nicaragua
Niger
Nigeria
Norway
Oman
Pakistan
Panama
Papua New Guinea
Paraguay
Peru
Philippines
Portugal
Senegal
Sierra Leone
Singapore*
South Africa
Spain
Sri Lanka
Sweden
Switzerland
Syria
Thailand
Togo
Trinidad and Tobago
Tunisia
Turkey
United Kingdom
United States
Uruguay
Venezuela
Zambia
Zimbabwe

*) Since trade-share data were not available for Singapore, the observation is not included in regressions R9 through R13.

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Publikasjoner fra NUPI




Internasjonal politikk kommer fire ganger i året og er det fremste tidsskriftet i Norden på sitt område. Når store begivenheter endrer det internasjonale landskapet, når skillene mellom nasjonal og internasjonal politikk viskes gradvis ut eller når norsk utenrikspolitikk endres, ønsker Internasjonal politikk å være helt i front med å utforske denne utviklingen. Tidsskriftet publiserer fagartikler, debatt og essays både fra Norge og nabolandene.
I 2004/05 har vi så langt brakt artikler om bl.a. USA – imperium eller hegemon?, Kyoto – et mislykket prosjekt?, Afrikanske konflikter, Westfalermyten, Ikkespredning, nordisk sikkerhetssamarbeid og konfliktløsning i Sudan samt et dobbeltnummer om Norge i 100 år etter unionsoppløsningen.

Abonnement: NOK 360 | abonnement utenfor Norden: NOK 480 | løssalg: NOK 95 porto/postal charge

Nordisk Øst·forum kommer fire ganger i året og er det ledende skandinaviskspråklige tidsskriftet på sitt felt. Tidsskriftets ambisjon er å dekke politisk og samfunnsmessig utvikling i en region i stadig rask endring – Sentral- og Øst-Europa og det postsovjetiske området. Tidsskriftet publiserer fagartikler, essays og bokomtaler. Første nummer i 2005 er et temanummer om utviklingen i landene mellom et ekspanderende EU og Russland: Ukraina, Hviterussland og Moldova. Det innholder artikler av ledende nordiske eksperter på de tre landene og gi bakgrunn for blant annet den pågående krisen i Ukraina.
Fra og med nr 2 - 2005 vil Nordisk Øst·forum være fagfellevurdert. I dette nummeret ser vi bl.a. på Europarådets behandling av Tsjetsjenia-konflikten, skilsmissen mellom tsjekkere og slovaker, hviterussisk historieskrivning, FNs habitatagenda i en russisk kontekst og miljøreformer i Latvia.

Abonnement studenter: NOK 285 | abonnement privatpersoner: NOK 350 | institusjoner: NOK 470
enkelthefter: NOK 115 porto/postal charge

Hvor hender det? er artikkelserien som – i konsentrert og forenklet form – gir deg økt innsikt i internasjonale spørsmål. I mange sammenhenger har vi behov for kortfattet framstilling av konflikter og samarbeid, prosesser, utfordringer og utviklingstrekk i det internasjonale samfunnet. HHD fyller dette behovet med sitt lett tilgjengelige format – 4 A4-sider, med 24 numre per årgang, pedagogisk tilrettelagt, utheving av stikkord, margspørsmål, bilder, kart og grafer. HHD finner du også på Internett – nær 300 artikler fra tidligere årganger, men aldri inneværende årgang.

Gruppeabonnement (10 eller flere): NOK 75/ab. | enkeltabonnement: NOK 270 | enkeltabonnement utenfor Norge: 370

Forum for Development Studies har i mange år vært Norges ledende tidsskrift innenfor utviklingsforskning. I senere år har det mer systematisk henvendt seg til beslektede miljøer i Norden med sikte på å bli et Oslo-basert *internasjonalt* tidsskrift. Siktemålet er å forbedre kvaliteten på norsk og nordisk forskning på utvikling, nord–sør-forhold og bistand. Samtidig ønsker redaksjonen å formidle resultater fra forskningen og stimulere til debatt.
Forum kommer ut med to hefter i året (vår og høst) og utgis av Norsk Utenrikspolitisk Institutt i samarbeid med Norsk Forening for Utviklingsforskning.

Abonnement: NOK 220 | abonnement utenfor Norden: NOK 300 | løssalg: NOK 120 porto/postal charge

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