

Structure for a protocol

Main title	What is the empirical evidence around the economic growth impacts of corruption in low-income countries?
Sub title	N/A
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Section	Protocol
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EPPI-Centre reference number	[To be completed by EPPI-Centre]
Month/year of publication	[To be completed by EPPI-Centre]
This report should be cited as...	
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Conflicts of interest (if any)	None
Acknowledgements	DFID for providing the funding for this piece of research

1. BACKGROUND

1.1 Aims and rationale for review

Corruption is an ancient problem, with which philosophers, economists, political scientists and policy-makers have grappled since 4th century BC. Yet, the explosion in the volume of literature examining the causes and consequences of corruption is fairly recent - with a peak in the 1990s and a continuing momentum through 2000s. From a 'sociology of knowledge' perspective, this timing is interesting because it coincides with liberalisation reforms and rapid globalisation. This coincidence, in turn, is not accidental because *corruption tends to thrive when the speed of market opening is faster than the speed of institutional development* necessary to address market imperfections and/or reduce transaction costs.

Against this background, scholars, policy-makers and practitioners have been engaged in a strenuous effort aimed at understanding the causes and consequences of corruption and identifying policy options that could reduce its incidence. As a result, a voluminous literature has emerged on the causes and consequences of corruption; and a large component of this literature examines the impact of corruption on economic growth (usually, measured as GDP or per-capita GDP growth). As such, the evidence base for policymakers interested in the impact of corruption on economic growth is large and expanding.

However, diversity of the studies in terms of methodology, data quality, and country groupings, coupled with the increasing volume of the literature on the corruption-growth relationship, call for a systematic synthesis of the existing evidence for two reasons. First, a systematic synthesis of the evidence is necessary to provide policymakers with verifiable and comparable estimates of the effect of corruption on economic growth. Secondly, a systematic review is also necessary to uncover the potential for new research avenues in terms of theory, methodology and data quality.

This systematic review aims to address these needs by: (a) synthesizing the **empirical evidence** on the corruption-growth nexus with a view to support evidence-based policy making; and (b) identifying potential avenues for further analytical and empirical research on the corruption-growth relationship. In doing this, the systematic review will pay special attention to the synthesis of the empirical evidence on the corruption-growth relationship with respect to **low-income countries**.

Unlike healthcare, education or social policy research, where systematic reviews constitute a well-established method of synthesizing research findings, systematic reviews in economics in general and development economics in particular are a new development. In addition, the nature of the data and data collection methods poses additional challenges to systematic reviews in economics. Studies in economics in general (and those on the corruption-growth relationship in particular) may draw on cross-sectional data with or without a time dimension, or on time-series data. In addition, the sample, the estimated model, the regression methods, and the quality of the data may differ from one study to the other.

The proposed review will address these challenges and maximise the reliability of the synthesis by:

- a. Conducting a meta-analysis of the evidence from *all* empirical studies to be selected in accordance with pre-specified inclusion/exclusion criteria;
- b. Providing a meta-synthesis of empirical study *clusters* pooled together on the basis of a common characteristic such as the model used, country composition, regression method, and publication type;

- c. Comparing and conducting sensitivity analysis of the findings in (a) and (b) with a view to ascertain model, method or publication bias;
- d. Providing a narrative synthesis of the theoretical/analytical explanations of the corruption-growth relationship; and
- e. Mapping the synthesized empirical evidence with the synthesized theoretical evidence, with a view to provide a better evidence base for policy making and further research.

Conducting the meta-analysis on the basis study clusters sharing some common characteristics will enable us to control for methods, samples and channels through which corruption interacts with growth. On the other hand, mapping the empirical synthesis with the theoretical/analytical synthesis will enable us to identify the scope/need for further research. In this exercise, we will draw on the mixed methodology proposed by Harden and Thomas (2005).

1.2 Definitional and conceptual issues

1.2.1 Corruption: definition and measurement

Like many concepts in social sciences, corruption can refer to different practices involving different actors; and may have different consequences in different contexts. Despite this complexity, a principal-agent definition of corruption captures the nature of the problem fairly well. In this definition, corruption is a principal-agent problem that involves an agent (usually a government official with a given level of authority and accountability) who utilizes the public office to secure private gains from a principal (usually a member of the public) who is unable to hold the agent accountable due to high monitoring costs. (See, Groenendijk, 1997). As such, corruption is essentially an un-documented transaction between a principal who is constrained in compelling the agent to deliver a service at a normal cost; and an agent who is able to impose a surcharge on the cost of service delivery due to high monitoring costs. This definition excludes corrupt/collusive practices that private actors (e.g., corporations) may engage in to secure excess gains from their transactions with consumers, suppliers of creditors. This exclusion can be justified on two grounds. First, private-private collusion does not necessarily reflect the proneness of a governance regime to abuse of public authority. Secondly, such corrupt practices are subject to and governed by long-standing and specialised legislation and policy regimes governing competition, regulation, and protection of consumers, creditors and third parties.

In this systematic review, we adopt a principal-agent definition for an additional reason too. Alternative policy intervention models that recommend either 'monitoring and intervention programs' or a 'change in the rules of the system' are both compatible with a principal-agent model of corruption. Furthermore, this definition also encompasses different practices, including side payments, nepotism, bribes, etc; and different types of 'agents', including ministers, members of parliament, and state bureaucracy in general.

The empirical research findings that will be synthesized in this review are based on survey data or country-expert assessments collected by a large number of organisations and research institutions – ranging from African Development Bank through European Bank for Reconstruction and Development to Transparency International and World Bank (See **Table 1.2.A1** in **Appendix 1.2** below). In its current form, the corruption data poses 2 challenges for empirical research as well as systematic reviews thereof.

The first challenge is due to differences in sampling methodology and survey questions used for conducting the surveys or expert assessments. This heterogeneity may lead to significant

divergence between reported corruption (or governance) measures and as such may lead to reduced scope for comparative assessment or systematic synthesis of the empirical work utilizing different data sources. However, although divergence may exist between existing measures of corruption (or governance quality in general), the extent of convergence (measured in terms of correlation) among different data sources tends to be high. According to Kaufmann et al (2007), the coefficient of correlation is 70% or more. This high degree of correlation allows for comparative assessment or systematic synthesis of empirical findings based on different data sources, but such assessments or syntheses must be explicit about the methodological or structural differences between surveys or expert views used to compile corruption measures.

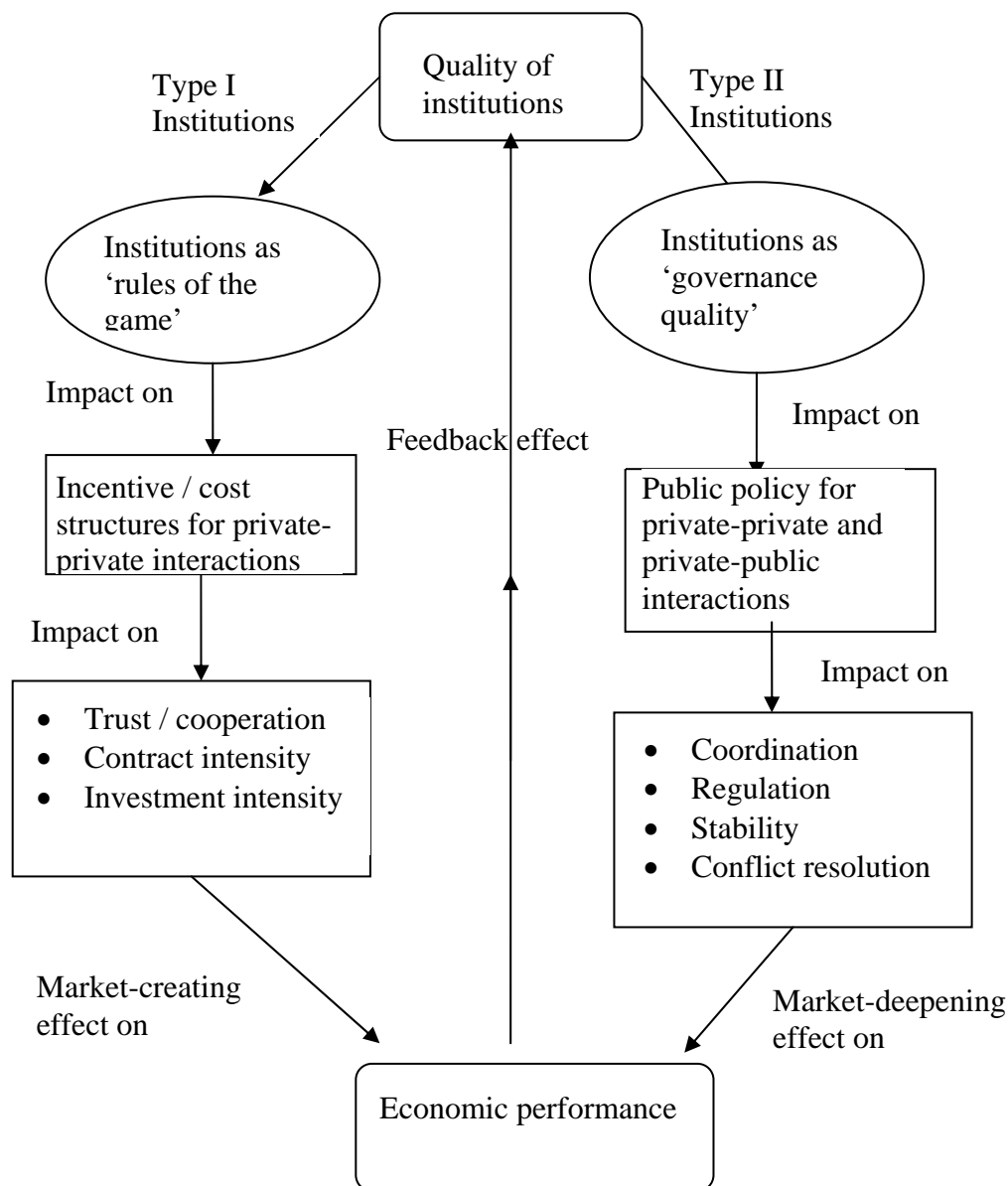
The second challenge relates to the perception-based nature of the survey data and/or expert assessments. The problem here is that of a 'halo effect' or reverse causality that may render the corruption measure to be a reflection of economic performance (say, growth). To the extent that this is the case, regressing growth on corruption as a possible determinant may yield spurious results due to the endogeneity problem. This issue has been discussed widely in the literature, of which Kurtz and Schrank (2007) is a recent example. However, the endogeneity problem (either due to perception-based nature of the data or because of the dependence of governance quality on economic development) can be and has been addressed in the empirical literature on governance (including corruption) and growth. For example, Acemoglu et al (2001) have introduced instrumental variables (e.g., settler mortality rates in early colonial period) as a proxy for institutional quality. They have demonstrated that institutional quality is the determinant of economic performance rather than the other way round. Using Granger causality tests, Rodrik et al (2004) have also demonstrated that the endogeneity problem can be addressed and that institutions tend to be more powerful determinant of economic performance compared to policy variables such as openness to trade.

Given these findings, we are confident that a systematic review of the empirical research findings on the corruption-growth relationship would be both feasible and meaningful. The way in which we conceptualise this systematic review (meta analysis of the evidence from aggregate and clustered studies with a common characteristic in terms of data, methodology and channel) will enable us to address the issues discussed above, and to apply a critical appraisal/quality assessment of the studies in a manner informed by the theory and method of investigating the corruption-growth relationship.

1.2.2 The corruption-growth relationship: channels and causal mechanisms

As indicated above, the incidence of corruption and interest in its causes and consequences began to increase in early 1990s. These developments unfolded against the background of transition from central planning to market economy in central and eastern European countries, and liberalisation of trade and capital movements in developing countries. In fact, the interest of researchers and policy makers in corruption was part of a paradigm shift instigated by these developments. The shift represented a relaxation of some of the central assumptions of the neo-classical economic theory. The latter had taken the existence of market-supporting institutions for granted and as such it relied too heavily on prices as a signal that generates an optimal equilibrium through its effects on rational economic agents' expectations and decisions. Yet, the quality of economic governance institutions (formal or informal rules, norms, and conflict-resolution arrangements) also affects economic actors' expectations and the incentive-cost structures under which they make decisions. And as such, they may lead to sub-optimal equilibria even if the 'price' signal is not distorted through government control or intervention.

Figure 1.2.1: Institutions and economic performance: a diagrammatical model



This effect had been recognised since Adam Smith (1976: 910), who postulated that ‘commerce and manufactures can seldom flourish in any state ... in which there is not a certain degree of confidence in the justice of government.’ In another section of his *Wealth of Nations*, Smith related the cross-country differences in investment rates (hence, the differences in growth rates) to differences in the quality of institutions such as rule of law and property rights. Despite continued but largely marginalised interest in the role of governance institutions, the incorporation of the latter into standard economic analysis did not materialize until early 1990s when Douglas North published his work on institutions and economic performance. In this book and in a seminal article published in 1994, he

demonstrated how institutions form the incentive structure of a society and how they can act as the underlying determinant of economic performance (North, 1990; 1994).

As can be seen from Figure 1.2.1 above, institutions can be conceptualised as either 'rules of the game' that govern private-private interactions in a society or as 'governance quality' that governs public-private and private-private interactions. While institutions as 'rules of the game' affect the cost/incentive structures faced by private actors; institutions as 'governance quality' affects public policy and private-public as well as private-private interactions. At the next level of analysis, institutions as 'rules of the game' affect private-private transaction costs and investment decisions, while institutions as 'governance quality' affect the set of opportunities for private-private and private-public contracting. Eventually, both types of institutions affect economic performance in a country through their market-creating and market-deepening effects.

Yet, the relationship between institutional quality and economic performance is not unidirectional, with the effect flowing from institutions to economic performance only. The feedback effect from economic performance to institutional quality may be due to two reasons. First, higher levels of economic development enable societies to afford the costs associated with building and maintaining better-quality institutions. Secondly, economic performance is likely to affect public perceptions of institutional quality at a given time, with good (bad) performance being associated with positive (negative) assessments of institutional quality. As institutional quality data is usually collected via surveys of economic actors whose perceptions of existing institutions are likely to be influenced by how well the economy is performing at a given time, reported measures of institutional quality may be endogenous. The existing literature addresses these endogeneity and reverse-causality problems by the use of appropriate instruments or proxies that are less likely to be influenced by economic performance; or through causality tests. (See Acemoglu et al, 2001; Rodrik et al, 2004).

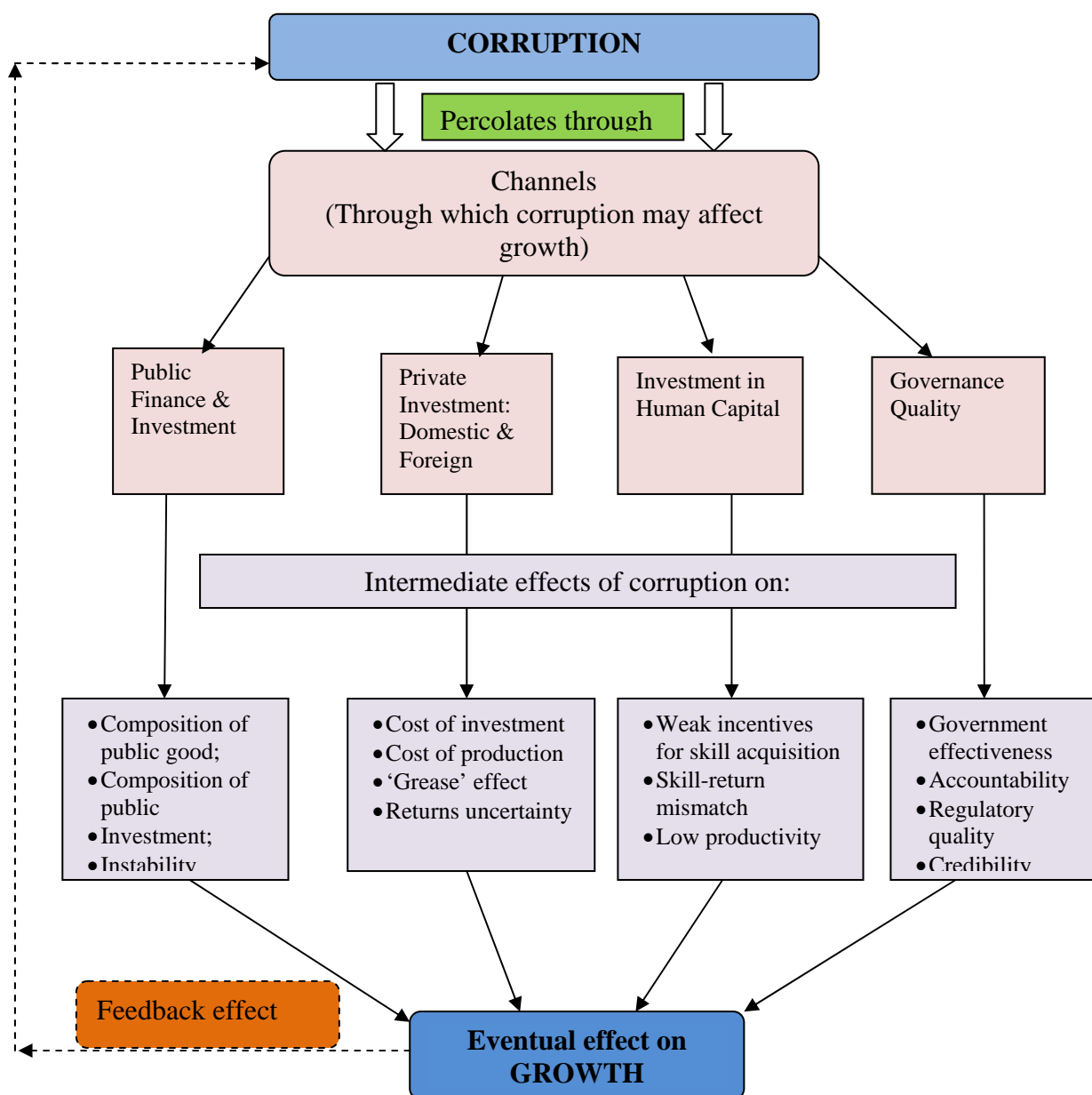
Research into the impact of corruption on economic performance (including growth) has been part of this 'institutional revival' indicated above. This is natural because corruption is both a cause and symptom of poor institutional quality, which distorts the true costs and incentives associated with economic decisions.

The proposed systematic review will apply the institutional-logic model to the synthesis of the empirical evidence on the corruption-growth relationship. In our review, corruption will be taken as a 'state variable' that captures the characteristics of the environment in which private economic actors (the principals) interact with public officials (the agents) and with each other. This state variable differs between countries and over time within each country; and the review postulates that inter-country differences in economic growth (the observed outcome) is causally related to differences in the state variable (i.e., level of corruption).

The systematic review will pay attention to the causal mechanisms and channels through which corruption affects economic growth, as depicted in Figure 1.2.2 below – which is compatible both with the institutional model presented in Figure 1.2.1 and with the analytical/empirical models used in the literature on the corruption-growth relationship – the subject of this systematic review.

One channel through which corruption may affect economic growth is private investment - domestic and foreign. The investment-induced effect of corruption on growth may occur as a result of: (i) increased cost of investment (hence lower investment); (ii) quicker investment permits (hence higher investment); (iii) increased indirect cost of production; and (iv) increased uncertainty about future returns on invested capital.

Figure 1.2.2: Channels through which corruption may affect economic growth



Corruption may also affect growth through public investment. The effect here may be due to adverse selection of public investment projects or bias in allocation of public funds towards large and capital-intensive projects. In the case of adverse selection, projects with higher political returns may be selected at the expense of projects with higher economic and social returns – with the consequence of inefficiencies and lower (or perhaps negative) growth effects. In the case of biased resource allocation, corruption may lead to unsustainably high levels of public investment financed at high costs of public borrowing – with the consequence of unsustainable growth.

A third channel through which corruption may affect economic growth is private investment in human capital, measured in terms of years of education or educational qualifications. This effect may materialize because, under corruption, meritocracy does not function effectively

as an institution that matches skills/competencies with earnings potential; and as a result, corruption may reduce growth through reduced incentives for investment in human capital.

Corruption also affects economic growth through its adverse effects on the quality of governance institutions in general. Given the well-documented relationship between governance quality and economic outcomes (including growth), this systematic review will try to capture the effect of the interaction between corruption and institutional/governance quality in general.

The causal mechanisms through which corruption may affect economic growth are similar to those identified and examined in the literature on institutional quality and economic performance in general. Corruption is a measure of institutional weakness or misgovernance that affects the optimising decisions of economic actors through the distortions it causes in the cost and incentive structures they face. As a state variable, corruption distorts the risks associated with investment decisions, the cost of transactions, the level of trust, and the capacity of the polity to resolve distributional or growth conflicts. As such, it distorts the capacity of a country to achieve economic growth through creation of new market opportunities or deepening of the existing ones.

In the light of the discussion above, we can conclude that a systematic review of the empirical literature on the economic growth impact of corruption will be a timely exercise in terms of addressing the need for evidence-based policy design; and a sound intellectual undertaking as it will be grounded within a well-developed theoretical/analytical framework.

Nevertheless, and as indicated in Section 1.1 above, a systematic review on the corruption-growth relationship faces additional challenges when compared with systematic reviews examining the impact of an intervention (say, a particular treatment or a public policy intervention) on a well-defined outcome (say, mortality or recovery rates or level of welfare). This is for three reasons. First, corruption is a state variable that co-exists with a multitude of other variables that may also affect the observed outcome (economic growth). Secondly, the state variable itself may be determined endogenously together with the outcome. Thirdly, the economic theories explaining the corruption-growth relationship are tested with empirical models that may share some common characteristics but are likely to differ in term of specification (i.e., the number of independent variables they include) or estimation methodology. Therefore, empirical findings on the corruption-growth relationship are highly likely to be model-dependent and/or dependent on the quality of corruption data used for estimation.

However, and as indicated in Section 1.1 above, modelling of and testing for the corruption-growth relationship has benefitted from significant developments in institutional economics, economic governance, and development research. Therefore, a systematic review of the empirical evidence on the corruption-growth relationship can now be based not only on a well-developed theoretical/analytical framework, but also on an effectual empirical framework. The proposed review will benefit from this level of development to synthesize the empirical evidence by taking into account the type of models used, the country groups included, and the channels of interaction between corruption and growth. As such, it will increase the comparability of the reported estimates and provide a range of meta synthesis results rather than a single result. In addition, it will map the empirical syntheses with theoretical/analytical explanations of the effect of corruption on economic growth.

1.3 Policy and practice background

Attempts aimed at reducing the incidence of corruption and improving governance quality in general have been at the centre of policy coordination and policy advice led by international organizations such as The United Nations, The World Bank, The IMF and government departments involved in issues of international development such as DFID.

The United Nations has led the Mexico conference of 2003 that adopted the legally-binding UN Convention against Corruption in May 2004. The Convention obligates the 120 signatories to make corruption a criminal offence, to develop institutions that will prevent it, and to engage in collaboration and policy coordination aimed at reducing the incidence of corruption. According to UNDP, this is justified because corruption not only impedes development, but also undermines democracy by corroding democratic institutions and the rule of law. In addition, the Convention acquires a special urgency because the negative effects of corruption mainly fall on already disadvantaged groups such as the poor, women and minorities.

This approach is also observable within the World Bank. Faced with mounting evidence of corruption and its adverse consequences in transition economies in the 1990s, the World Bank began to place emphasis on the need to reduce corruption as a necessary step to reach the long-term goals of sustainable growth and poverty alleviation. As a result of this orientation, the World Bank has been instrumental in the development of tools and frameworks aiming to reduce corruption and ensure transparency and accountability in aid and development policies. To this effect, the World Bank has developed diagnostic tools, commissioned and produced analytical work, and provided training programmes.

This approach is shared by DFID, who defines corruption 'as a symptom of governance and institutional failures, rooted in social systems and political culture.' Although DFID is interested in both national and international causes of corruption, one of its main objectives is to develop better measures of corruption and evaluate the effectiveness and limitations of the 'legal instruments, institutions, and policies' required to tackle corruption.

Finally, the IMF commits to 'work with its members to promote good governance and to prevent and address corruption' in areas where it has a 'mandate and expertise'. The most prominent among these are public resource management, tax administration, financial sector soundness, and central bank safeguards. The IMF is also of the view that tackling corruption requires strong and transparent procedures and institutions that would ensure accountability. Like the World Bank, The IMF too provides technical assistance to its members to strengthen their capacity to combat corruption.

The brief summary above demonstrates clearly that there is an ongoing international will to combat corruption and to understand its causes and consequences. It also demonstrates that there is a wide-spread consensus on the need to develop a better and firmer understanding of the direct and indirect effects of corruption on sustainable growth in particular and development in general. Therefore, a systematic review of the literature that has emerged over the last two decades would be not only a timely effort, but also a significant step towards aggregating the evidence concerning the impact of corruption on growth and the channels through which this effect unfolds. By addressing these issues, our proposed systematic review will be not only a reflection of the national/international policy orientation over the last two decades. It will also dovetail with the policy-makers' ongoing search for reliable evidence as a basis for further policy development. To the extent that we

can meet this challenge, our systematic review will also enable us to identify some of the next-generation questions for research, policy and practice.

1.4 Research background

1.4.1: Theoretical and empirical research on corruption-growth relationship: an overview

As indicated in Section 1.2 above, corruption can be conceptualised as a principal-agent problem, where the agent (usually a public official) abuses his/her public authority to impose a surcharge on the delivery of a service (which may be legal or illegal) to a principal who may be a natural or legal entity unable to hold the principal to account. Thus defined, corruption leads to a number of questions that researchers have to address. Svensson (2005) identifies eight such questions:

- a. What is corruption?
- b. Which countries are the most corrupt?
- c. What are the common characteristics of countries with high corruption?
- d. What is the magnitude of corruption?
- e. Do higher wages for bureaucrats reduce corruption?
- f. Can competition reduce corruption?
- g. Why have there been so few (recent) successful attempts to fight corruption?
- h. Does corruption adversely affect growth?

This systematic review is related to the last question, which addresses the effect of corruption on growth. Early work on this question suggests that corruption may result from excessive government regulation and intervention, which induce firms or individuals to circumvent them by bribing public officials. In such settings, corruption may have a positive effect on economic growth as it allows firms and individuals to 'get things done' in a country with high levels of bureaucratic hold-ups and 'bad' laws (Huntington, 1968). However, Myrdal (1968) pointed out that the distortions that private agents try to circumvent through corruption should not be taken as given. Instead, they and corruption should be considered as symptoms of some underlying institutional weaknesses that, in turn, induce public officials to increase the level of administrative holdups in order to secure higher levels of bribes.

This early debate was *de facto* resolved in favour of a research agenda that draws on Huntington's argument. This was due to the prevalence of excessive regulation and government interventions (which ranged from restrictions of trade and investment flows through control of exchange rates to control of interest rates); and the marginalized status of the institutional approach to economics. As a result, academics and policy makers alike had concentrated on the rent-seeking behaviour that excessive interventions have induced, the negative consequences of rent seeking, and liberalisation reforms as an antidote to rent seeking. The pioneering work in this area is Krueger (1974), who examined the causes and consequences of rent-seeking behaviour in the context trade restrictions in Turkey.

Yet, the explosion of corrupt practices in the transition economies of central and eastern Europe and the increased visibility of the correlation between high levels of corruption and liberalization reforms in developing countries, coupled with developments in institutional economics, have tilted the balance in favour a research agenda that draws on Myrdal's insights in the early debate on the corruption-growth relationship.

At the microeconomic level, the negative impact of corruption on entrepreneurial skills, firms' choice of technology and farmer's choice in favour of farming methods were documented in the 1980s and early 1990s (see, Svensson, 2005: 37-38).

At the macroeconomic level, Mauro (1995) is cited as the first attempt at estimating the impact of corruption on economic growth empirically. Although Mauro (1995) does not find a significant relationship between corruption and growth, he did find a significant relationship between bureaucratic efficiency and growth. Given the latter, the failure to discover a significant relationship between corruption and growth may be due to data quality. Indeed, using a larger data set, Mauro (1996) finds out that the effect of corruption on investment and per-capita income growth rates are negative and statistically significant. A one-standard-deviation in improvement in control of corruption is found to be associated with a 4 percentage point increase in investment rate and a 0.5 percentage point increase in per-capita income growth per annum. Mauro's results were later confirmed by Mo (2001), Meon and Sekkat (2005) and Podobnik (2008), who report consistently that corruption is detrimental to economic growth.

Nevertheless, Aidt et al (2006) have come up with a more nuanced finding on the corruption-growth relationship. They report that corruption has a regime-specific impact on growth in that it has the most harmful effect in countries with good quality institutions but little impact in countries with weak institutions. Svensson (2005) does find a negative relationship between corruption and growth, but this was not statistically significant. Finally, Meon and Weill (2010) estimate the effect of corruption on output per employee (a measure of efficiency rather than growth per se) and find a similar result to that of Aidt et al (2006) in that corruption is less detrimental to efficiency in countries where institutions are weak, but more detrimental to efficiency in countries with good institutions.

The brief review above enables us to make three observations. First, empirical evidence on the corruption-growth relationship tends to point out a negative effect of corruption on growth. Secondly, although the majority of the studies summarized here report a negative relationship between corruption and growth, some report that the estimated effect is statistically insignificant. Thirdly, when non-linear models of estimation are used, the effect of corruption tends to be regime- or country-specific, with higher negative effects in developed countries with good institutions and lower or insignificant effects in less developed countries with weak institutions. These observations point out the need to conduct a complete and systematic review in order to synthesize the findings on the basis of models used for estimation, country groups and effect channels. Such systematic review will also be useful in identifying gaps in the literature and suggesting new avenues for further research.

1.4.2: Reviews of the corruption-growth literature: few and far in between

Although the theoretical work on corruption has a long history, only a few reviews of the literature exist, of which Bardhan (1997) is the first attempt. Bardhan classifies the literature into a number of thematic areas, including: (i) the static effects of corruption on efficiency; (ii) the types of corruption (centralized v de-centralized) and their differential impacts on efficiency; (iii) differences in level and persistence of corruption; (iv) corruption and growth; and (v) policy options for tackling corruption. This review is very useful for identifying the theoretical/analytical issues in the study of corruption – and for understanding the dynamics that may explain the level, persistence and variation of corruption across countries and over time. However, Bardhan (1997) provides only a limited review of the empirical work on the relationship between corruption and growth. This limitation, however, is reflection of the

fact the empirical research was still in its early stages – and not of an oversight by the author.

The relative absence of empirical work in Bardhan's (1997) review has been addressed by Wei (1999), who reviews the existing empirical work and provides new evidence on the relationship between corruption and growth. He reports that 'countries with high levels of corruption experience poor economic performance'. The adverse effects of corruption on growth and development are reported to result from reduced domestic investment, discouraged foreign direct investment, overspending in government, and distorting the composition of government spending. Wei (1999) then discusses various policy options, including reforming the government's role in the economy, merit-based recruitment and promotion of civil servants; paying civil servants a salary competitive with similar jobs in the private sector; and international pressure on countries with high levels of corruption.

Another review is conducted recently by Aidt (2009), who takes a critical look at categorising the literature into two rival camps: the 'sanders' who argue that corruption is detrimental to growth and the 'greasers' who argue that corruption may aid growth by enabling economic actors to circumvent bureaucratic holdups. He concludes that the evidence supporting the 'greasing the wheels hypothesis' is very weak and shows that there is no correlation between a new measure of managers' actual experience with corruption and GDP growth. Instead, he reports a strong negative relationship between growth in per-capita wealth (not per-capita GDP) and corruption – suggesting that corruption may be associated with unsustainable wealth generation even if its effect on GDP is not certain.

1.4.3: The rationale for a systematic review: intellectual and policy relevance

To our knowledge, the less than handful reviews mentioned above are the only reviews of the empirical literature on the corruption-growth relationship. Of course, this does not mean to suggest that existing studies do not provide brief reviews of the existing work relevant to their research questions. However, such reviews are limited in scope/coverage and selective by design. Therefore, a systematic review of the empirical literature on the corruption-growth relationship will be a timely exercise from a policy as well as intellectual perspective.

A systematic review will be policy-relevant for two reasons. First, it can address the need for reliable and verifiable evidence as an input into the policy-making process. Secondly, the large and increasing volume of the empirical literature, and the varied and sometimes conflict nature of the reported findings, complicates the task of policy makers seeking reliable and verifiable evidence. The proposed systematic review, the first on the topic of corruption-growth relationship, will square the circle of needs and means by synthesizing the empirical evidence and mapping this evidence with theoretical explanations. As such, it will provide policy-makers with reliable and verifiable information on how corruption may affect economic growth and by how much.

The intellectual relevance of the proposed systematic review stems from the need to take a systematic stock of the literature as a basis for identifying gaps and further research avenues. Since early 1990s, the literature on the corruption-growth relationship has demonstrated a high degree of innovation and creative thinking in terms of methodology and model building. Some of the most recent examples of innovation (e.g., Aidt, 2009 and Evrensel, 2010) indicate there could be new channels through which the corruption-growth relationship may be captured – namely factor productivity growth and growth volatility. The proposed systematic review will provide a comprehensive summary of the progress made and the scope for new research avenues in the area of corruption-growth relationship.

1.5 Objectives, Scope and Milestones

This systematic review addresses the following question: ***What is the empirical evidence around the economic growth impacts of corruption in low-income countries?***

It aims to synthesize the empirical findings on the effect of corruption on economic growth, which is usually measured as growth in gross domestic product (GDP) or per-capita GDP growth. As indicated in Sections 1.1 and 1.2 above, the topic of this review (the corruption-growth relationship) has been examined theoretically and empirically. The brief reviews in Sections 1.4.1 and 1.4.2 above provide summary information on the theoretical debate and empirical findings. Given this background, Section 1.4.3 states the case for a systematic review in terms of policy and intellectual relevance.

The focus of the review will be the empirical evidence on the corruption-growth relationship, with a special attention to the evidence on low-income countries.

The existing literature suggests that corruption may affect growth in different ways in different contexts; and as such, it points out the need to classify and synthesize these effects and the channels through which they unfold. Therefore, the proposed systematic review will consist of three sections:

- A. This section synthesizes the empirical evidence on corruption-growth relationship – using meta-regression analysis methodology that draws on relevant work in economics, such as Mitchell et al (2005); Doucouliagos and Paldam (2009); Stanley and Jarell (1989); and Stanley and Doucouliagos (2007);
- B. This section synthesizes the theoretical explanations of the corruption-growth relationship - by drawing on the narrative synthesis methodology proposed by Popay et al (2006) and Rogers et al (2009); and
- C. This section provides an overall conclusion that maps the meta synthesis with narrative synthesis, with a view to identify the scope/need for further research – drawing on ‘mixed methods synthesis’ proposed by Harden and Thomas (2005).

In this design, the meta-synthesis of the empirical evidence (Section A) constitutes the major component/task that addresses the immediate aim implicit in the review question – namely the synthesis of the empirical evidence on the corruption-growth relationship. Sections B and C will play a complementary role, but will add value by providing a systematic assessment of the existing ‘knowledge’ on the corruption-growth relationship. As such, the combination of empirical and theoretical syntheses can be considered as an innovative element that reflects the fact that the review is the first in the area of corruption-growth relationship.

As stated above, this review is about the growth consequences of a ‘state variable’ (a country-specific governance characteristic) in low-income countries. However, the large majority of the empirical research is based on aggregate cross-country or panel data that include both low-income and other countries.

We will try to control for income level of countries in two ways. First, we will report the meta synthesis of the evidence that control for low-income countries explicitly. Secondly, we will report the meta synthesis of the panel-data regressions that are based on a random-effects estimation. As opposed to fixed-effects estimation, which can only support inference about the actual cases (countries) in the sample, the random-effects estimation supports inference about the population (i.e., all countries in the world) from which the sample is drawn. In other words, the meta-synthesis of the random-effects regression evidence can be used for inference about low-income countries as well as other countries – with an associated confidence interval. At the evaluation/critical appraisal stage of the review, we will code empirical studies to capture the country group included and the estimation method used.

The **milestones** in the review process are as follows:

Time-frame	Tasks to be completed
3 September 2010	<ul style="list-style-type: none"> • Protocol completed in the light of reviewers' comments, approved by DFID.
6 – 20 September 2010	<ul style="list-style-type: none"> • Complete the search and store search results on EndNote
21 September – 5 October 2010	<ul style="list-style-type: none"> • Upload search results on to EPPI Reviewer • Apply selection Criteria on the basis of title/abstract information • Code selected studies (S) and de-selected studies (D) • Document the initial selection process.
6 October – 12 November 2010	<ul style="list-style-type: none"> • Carry out evaluation/critical appraisal • Apply inclusion/exclusion criteria, code included studies as 'I' and excluded studies as 'X' • Carryout manual search and evaluate, using the same inclusion/exclusion criteria • Document included and excluded studies • Code study characteristics (e.g. estimation method, publication type, etc.) • Fill in data/information extraction forms for each included study
15 November – 20 December	<ul style="list-style-type: none"> • Conduct meta-analysis of reported empirical estimates • Conduct narrative synthesis of theoretical/analytical explanations • Map meta synthesis with narrative synthesis • Write the Review and submit to referees

2. REVIEW METHODOLOGY AND PROCEDURES

2.1 User involvement

Our starting point in the process of identifying the potential users of the review has been the review specifications spelled out by DFID and the consultations we have had with the policy leads at DFID. As a result, we now have the necessary information about DFID's expectations of the review. These expectations include: (i) possible use of the systematic review as an evidence base for policy development; (ii) identifying possible gaps in the theoretical and empirical literature; and (iii) identifying new research questions that may inform both new research and/or new systematic reviews of the existing research.

We aim to expand the range and composition of the potential users by following a two-pronged strategy. On the one hand, we draw on the University of Greenwich's research and publicity infrastructure to disseminate the review findings through press releases, Greenwich-based workshop presentations, and web presence on the University of Greenwich website. On the other hand, we will liaise with the University of Greenwich Director for International Partnerships, who works closely with higher education institutions in developing countries, including Bangladesh and Ethiopia. The aim here is to present the findings of the review and elicit debate through workshops open to the faculty of partner institutions, civil society organisations, and local/national policy-makers in the host country. We aim to organise 2 overseas workshops – one in Bangladesh and one in Ethiopia.

Finally, we will revise and update the review in the light of the feedback given and comments raised in the workshops – with a view to publish it as a journal article. We think such an outcome will make the review available to a wider range of readers. In addition, we expect the journal publication to instigate scholarly interest in and debate on how systematic reviews can add value to the conventional literature reviews that are the dominant form of reviews in economics in general and development economics in particular.

2.2 Review Stages and Methodology: The Pre-Analysis Phase

In this section, we explain the methods and procedures that will guide the **first 4 steps** in the review process. These are:

1. Searching and Search Criteria;
2. Initial Screening on the basis of title/abstract information;
3. Critical appraisal and applying Inclusion/Exclusion Criteria on the basis of full-text information; and
4. Data/Information Extraction

The final phase, which consists of the synthesis and writing up, and the synthesis methods to be used are explained in Section 2.3 below.

STEP 1: SEARCHING and SEARCH CRITERIA

Our search strategy consists of 2 components:

- a. Database selection; and

- b. Concept/keyword specification, searching, and storing/documenting the search results.

2.2.1(a): Database selection

Databases that will be searched for studies on the corruption-growth relationship consist of a comprehensive list, drawn on the basis of our research experience and referee comments/recommendations received on the draft Protocol. The databases are grouped under 3 categories, reflecting 3 publications types: Published studies, working papers and reports, and theses.

(i) Databases for published studies

We will search for **journal articles, books and book chapters** in the **following databases**:

- 1. EBSCO:** International Bibliography of the Social Sciences (IBSS) - economics, politics, sociology, anthropology and Economics)
<http://www.csa.com/htbin/dbrng.cgi?username=greenwichuni&access=welcome>
- 2. EBSCO:** Business and Economics Databases
<http://search.ebscohost.com/Community.aspx?authtype=ip&ugt=723731563C8635473786350632853E8223E365D36013609369E328E336133503&return=y&IsMobile=N>
- 3. SCIEDIRECT** – All sciences and humanities
http://www.sciencedirect.com/science?_ob=HomePageURL&_method=userHomePage&_btn=Y&_acct=C000027518&_version=1&_urlVersion=0&_userid=634187&md5=0afa29013cc300e420d26fa98ae36c3c
- 4. WEB OF KNOWLEDGE** – All sciences and humanities
http://apps.isiknowledge.com/UA_GeneralSearch_input.do?product=UA&search_mode=GeneralSearch&SID=T2e6Bncg9ABckBdGfdc&preferencesSaved=
- 5. JSTOR** – Social sciences
<http://www.jstor.org/action/showBasicSearch>
- 6. ECONLIT**
Available on ScienceDirect.
- 7. ISI – WEB OF KNOWLEDGE**
http://apps.isiknowledge.com/UA_GeneralSearch_input.do?product=UA&search_mode=GeneralSearch&SID=R1Be7P8B6KIJ2O@OONg&preferencesSaved=

(ii) Databases for working papers, reports, etc.

For scholarly **working papers, reports, and forthcoming papers**, we will search in the following databases:

- 8. SOCIAL SCIENCE RESEARCH NETWORK (SSRN)**
<http://papers.ssrn.com/sol3/DisplayAbstractSearch.cfm>

9. NBER WORKING PAPERS

<http://www.nber.org/papers>

10. RESERACH PAPERS IN ECONOMICS (REPEC)

<http://econpapers.repec.org/scripts/search/search.asp?pg=-1>

11. CENTRE FOR INTERNATIONAL DEVELOPMENT OF HARVARD UNIVERSITY

<http://www.hks.harvard.edu/centers/cid/publications>

12. WORLD BANK – Working papers, reports

<http://publications.worldbank.org/ecommerce/>

13. IMF - Working papers, reports

<http://www.imf.org/external/pubind.htm>

14. UNDP – Research papers, reports

<http://www.twinside.org.sg/pos.htm>

15. ADB (Asia Development Bank) – Research papers, reports

<http://www.adb.org/Statistics/publications.asp>

16. AFDB (Africa Development Bank) – Research/working papers, reports

<http://www.afdb.org/en/documents/evaluation-reports/>

<http://www.afdb.org/en/documents/publications/working-paper-series/>

17. EBRD (European Bank for Reconstruction and Development) – Research papers, reports

<http://www.ebrd.com/pages/research/publications.shtml>

(iii) Databases for Theses

For **PhD Theses**, we will search in the following databases:

18 ECONLIT – contains indexes of PhD thesis submitted world wide
Available on ScienceDirect.

19. INDEX TO THESES – contains all theses submitted in Great Britain and Ireland universities.

<http://www.theses.com/>

(iv) Google Scholar search - #20

In addition to the databases listed above, we will search in **Google Scholar**, using the same search criteria.

(v) Manual search

In addition to the publication types to be searched in 3 databases and Google Scholar, we will conduct manual search after completing the evaluation/critical appraisal of the selected studies. The manual search aims to locate unpublished studies, grey literature not indexed on commercial databases, and to identify any study that may not be captured by the search above. Our manual search will be guided by the recommendations of JBI (2008) and CRD (2009), which include:

- Manual search in the reference lists of studies included in the final sample;
- Citation search to identify studies that precede recent studies
- Contacting governmental and inter-governmental agencies and relevant think-tanks not included in the list above; and
- Contacting the top 5 authors (in terms of publication number) whose work is included in the final sample.

The results from these searches will be subject to the same selection and inclusion/exclusion criteria used for determining the final sample of studies obtained through the normal search procedure.

2.2.1(b): Search criteria, database searches and storing search results

Searches in databases will be conducted as 'Title', 'Abstract', 'Keyword', and 'Text' searches. The search procedures are based on recommendations provided in the **EPPI Workshop** held at DFID and the text mining method suggested in CRD (2009); and will be driven by the following specifications:

Keyword 1: Corruption

Synonyms: **Misgovernance, rent-seeking, speed money, bribery, side-payment, institutions, institutional quality, grabbing hand, graft, fraud, sleaze, misconduct, malpractice**

(For 'Title' 'Abstract' and 'Keyword' search)

Keyword 2: Growth

Synonyms: **development, economic performance, income, output, investment, public finance, human capital, economic outcome**

(For 'Title' 'Abstract' and 'Keyword' search)

Keyword 3: Low-income countries

Synonyms: **Less developed countries, LDC, developing countries, Africa, Asia, Latin America, Middle East, World Bank list of low-income countries (country by country)**

(For 'Keyword' and 'Text' search)

Time period:

January 1990 – July 2010: for published journal articles, reports, and book chapters; and

January 1990 – July 2010: for working papers, policy research papers, discussion papers, and theses.

Language: Open

Initially, we will search in 'Title', 'Abstract' and 'Keyword' for Keywords 1 and 2, and their synonyms. Then, we will carry out a 'Keyword' and Text' search, using the 'Low-income countries' (Keyword 3) and its synonyms. Finally, we will use the 'Combine' command to combine the search results. This exercise will yield studies that have all specified keywords and their synonyms in 'Title', 'Abstract', 'Keyword' or 'Text'.

The search will be conducted by a research assistant, who is trained in search methodology and in use of the *EPPI Reviewer*. The research assistant will compile the search results in *EndNote* and upload the *EndNote* files to *EPPI Reviewer*.

The two reviewers (M. Ugur and N. Dasgupta) will supervise the search and check the combined results for any duplication. Duplicate studies will be removed manually to make sure that the study with the URL link to the full-text study remains in *EndNote*.

We will use *EPPI Reviewer* as a management tool for documenting the screening results pursuant to the PIOS framework (Step 2 below), the inclusion/exclusion decisions based on the inclusion/exclusion criteria (Step 3 below), and data extraction forms (Step 4 below).

We will provide a search summary for each round of the search process described above. The summary will be obtained automatically from the 'Search' facility of each Database. A sample of the search summary is presented in Appendix 2.1, Table 2.1.A1.

STEP 2: INITIAL SCREENING ON THE BASIS OF TITLE/ABSTRACT INFORMATION

At this stage of the review process, we will transfer the combined search results from *EndNote* to *EPPI Reviewer* – the data management software developed by the Institute of Education to help with systematic reviews.

The titles and abstract of all transferred search results will be screened to ensure that the studies are appropriate/relevant for the review question. During screening, we will draw on the PICOS framework recommended by the Centre for Reviews and Dissemination (CRD) of the University of York (CRD, 2009). Although PICOS has been developed for systematic reviews in health care, the framework can be adopted to this systematic review.

The PICOS framework requires screening of search results with respect to: (i) **P**opulation; (ii) **I**nterventions; (iii) **C**omparators; (iv) **O**utcomes; and (v) **S**tudy design. We revise this framework by dropping the 'Comparator' criteria as the research on corruption-growth relationship is not based controlled trials data, and by renaming the intervention as 'Independent variable' that is assumed to influence the outcome. The resulting framework can be abbreviated as **PIOS**, consisting of the four criteria below:

- a. **Population**
 - Does the study include 'low-income countries' or its synonyms in the **abstract** or **title**?
- b. **Independent variable**
 - Does the study include 'corruption' or its synonyms in the **abstract** or **title**?
 - Does the **study abstract** indicate that it analyses/estimates the corruption-growth relationship?
- c. **Outcome**
 - Does the study include 'growth' or its synonyms in the **abstract** or **title**?
 - Does the **study abstract** indicate that it analyses/estimates the corruption-growth relationship?
- d. **Study design**
 - Is the study theoretical/analytical?
 - Is the study using cross-country data?
 - Is the study using panel data?
 - Is the study using time-series data?
 - Is the study a simulation?

Table 2.2.2.1 below summarizes the selection criteria and the decision to be made. The criteria and the score ('yes' or 'no') will be coded in EPPI Reviewer for each study; and as such EPPI Reviewer records will demonstrate which studies are selected or de-selected at this stage and why.

In this procedure, a study will be selected for the next stage of the review only if it scores at least 1 'yes' for each criterion, and a minimum of 4 'yes' scores in total. A close examination of **Table 2.2.2.1** below indicates that this screening/selection procedure will ensure that a study selected for the next stage of the review will be compatible with the objective of the systematic review. Despite this precision, the methodology is not restrictive. This is because a study satisfying the decision criteria can be selected even if it may have some inadequacies in terms of estimation methodology or data quality or country coverage. Similarly, a study has equal chance of being selected, irrespective of the **magnitude** or **type** of the corruption effect on growth it reports. These qualities will help in reducing the risk of omitting relevant studies or that of publication bias.

Two reviewers (M. Ugur and N. Dasgupta) will apply these criteria to the search results independently. However, before independent screening, we will conduct a pilot of 10 studies listed in search results. The aim here is to test whether the proposed selection criteria can be interpreted reliably and consistently; and whether they are effective in classifying studies for selection or de-selection. Any discrepancies between reviewer decisions will be discussed, and both the discussion and the basis of *ex-post* agreement will be documented. According to CRD (2008: 24), piloting and independent screening increases the chance of selecting all relevant studies and ensures that the selection procedure can be repeated by third parties, if necessary.

Table 2.2.2.1: PIOS Criteria and Study Selection Decision

Criteria	Question	Score
Population	Does the study include 'low-income countries' or its synonyms in the text ?	Yes/No
Independent Variable	Does the study include 'corruption' or its synonyms in the title ?	Yes/No
	Does the study abstract indicate that it analyses/estimates the corruption-growth relationship?	Yes/No
Outcome	Does the study include 'growth' or its synonyms in the title ?	Yes/No
	Does the study abstract indicate that it analyses/estimates the corruption-growth relationship?	Yes/No
Study Design	If purely theoretical, does the study analyse the corruption-growth relationship?	Yes/No
	If empirical or mixed, is the study using cross-country data?	Yes/No
	If empirical or mixed, is the study using panel data?	Yes/No
	If empirical or mixed, is the study using time-series data?	Yes/No
	If empirical or mixed, is the study a simulation?	Yes/No
Decision and action	<ul style="list-style-type: none"> Select: if study scores at least 4 'yes', with at least 1 'yes' for each criteria. Code as 'S'. De-select: if study fails to score at least 4 'yes', with at least 1 'yes' for each criteria. Code as 'D'. 	

At the end of the screening stage, we will document the selection / de-selection decisions given. This information will be provided in a table that summarises:

- The total number of **selected** studies
- A Breakdown of the **selected** studies, based on the number of 'yes' scores it has secured;
- The total number of **de-selected** studies
- A Breakdown of the **de-selected** studies, based on the number of 'no' scores it has secured

The information for this table will be generated from the 'yes' and 'no' scores recorded in EPPi Reviewer for each study. As such, the basis on which selection/de-selection decisions are made will be easier to digest, and the evidence that underpins the decisions will be verifiable.

STEP 3: REFINED INCLUSION/EXCLUSION CRITERIA AT THE FULL-TEXT EVALUATION STAGE

Summary

At this stage, full text of all studies in the selected sample will be read independently by two reviewers (M. Ugur and N. Dasgupta). The reviewers will evaluate the selected studies with respect to **validity, reliability and applicability (VRA)**.

In this context, **validity** refers to the extent to which the study employs a methodology that would minimise the risk of bias; and **reliability** refers to the extent to which the findings of the study are re-producible. (Reynolds and Trinder, 2000; Booth and Price, 2004). **Applicability**, on the other hand, refers to the extent to which the findings of the study can be generalised/applied to low-income countries.

To ensure validity, reliability and applicability (VRA), we work with the **PIOS** framework used at the screening stage. The PIOS framework enables us to apply inclusion/exclusion criteria that span **population** (country composition), **independent variable** (corruption), **outcome** (corruption's impact on growth), and **study design** (validity and robustness of method). We apply 4 inclusion/exclusion criteria with respect to theoretical/analytical studies (TA); and 5 inclusion/exclusion criteria with respect to empirical studies (EM) or mixed studies (EM2). The criteria, their relationship to the PIOS framework, the questions with which the studies will be interrogated, and the decisions to be taken are summarised in Table 2.2.3.1 (for TA studies) and Table 2.2.3.2 (for EM and EM2 studies) below.

The **process** that leads to inclusion of studies in the final sample consists of 3 components: (a) identifying and coding the **content** of ALL studies that pass the screening stage as empirical (EM), theoretical/analytical (TA), or mixture of both (EM2); (b) **interrogating** the theoretical/analytical studies (TA) with respect to **4 inclusion/exclusion criteria** specified in Table 2.2.3.1 below; and (c) interrogating the empirical (EM) or mixed (EM2) studies with respect to **5 inclusion/exclusion criteria** in Table 2.2.3.2 below.

Component 1 of Step 3: Study content classification

We classify studies as empirical (EM), theoretical/analytical (TA) and mixed (EM2) in order to ensure that our final sample of included studies: (i) contains both empirical and theoretical/analytical studies so that we can map the meta-synthesis of empirical studies with the narrative-synthesis of the theoretical/analytical studies; and (ii) inclusion of one type of study (say, empirical study) does not happen at the expense of the other type (say, theoretical/analytical). In this context:

- An empirical study (EM) is a study that **utilises a valid model** for estimating the corruption-growth relationship;
- A mixed study (EM2) is a study that **analyses the impact of corruption on growth through a mathematically-derived model and uses empirical evidence to verify the model's predictive quality**.
- A theoretical/analytical study (TA) is a study that **analyses the impact of corruption on growth through mathematically- or diagrammatically- or verbally-derived models**. The main aim of TA studies is to develop models/explanations of the corruption-growth relationship rather than estimate the magnitude of the growth impact of corruption.

Both reviewers will compare their study type coding decisions and resolve any disagreement by consensus.

Component 2 of Step 3: Applying inclusion/exclusion criteria for theoretical/analytical (TA) studies

We will evaluate each theoretical/analytical study (coded as TA) with respect to 4 inclusion/exclusion criteria. The criteria and the questions to be used to interrogate the studies are given in Table 2.2.3.1 below.

Table 2.2.3.1: Inclusion/Exclusion Criteria for Theoretical/Analytical (TA) Studies: Merging the PIOS Framework with Validity, Reliability and Applicability Requirements

PIOS Heading	Inclusion/Exclusion Criteria	Question	Decision
Population	1. Model/analysis is of universal applicability	1. Is the analysis applicable in a low-income country context?	Yes -Include No -Exclude
Independent Variable	2. Corruption is an essential concept/variable in the analysis	2. Is corruption a central state factor/variable in the analysis of the study?	Yes -Include No -Exclude
Outcome	3. Corruption-growth relationship is central to the analysis	3. Is the growth-corruption relationship one of the main outcomes analysed in the study?	Yes -Include No -Exclude
Study Design	4. Substantial/original analysis	4. Does the study go beyond background/review information by providing a substantial analysis of the corruption-growth relationship?	Yes-Include and code No -Exclude

Decision rule: Include if TA study scores 4 ‘yes’, exclude otherwise. If excluded, indicate the number of the criteria that study had failed (1 to 4).

Component 3 of Step 3: Applying inclusion/exclusion criteria for empirical (EM) and mixed (EM2) studies

For empirical (EM) and mixed (EM2) studies, we apply 5 inclusion/exclusion criteria. The criteria cover the validity, reliability and applicability (VRA) requirements and are compatible with the PIOS framework. However, these criteria differ from the inclusion/exclusion criteria used with theoretical/analytical (TA) studies. The difference is due to the shift in the evaluation towards the nature of the empirical data used, its quality, and the quality of the

estimation/testing methods used in the study. The list of the criteria and the interrogation questions they imply are given in Table 2.2.3.2 below.

Table 2.2.3.2: Inclusion/Exclusion Criteria for Empirical (EM) and Mixed (EM2) Studies: Merging the PIOS Framework with Validity, Reliability and Applicability Requirements

PIOS Heading	Inclusion/Exclusion Criteria	Question	Decision
Population	1. Data including low-income countries	1. Does the study use data including 'low-income countries' or its synonyms?	Yes -Include No -Exclude
Independent Variable	2.Documented/recognised corruption data source	2. Does the study use a documented/recognised corruption data source ?	Yes -Include No -Exclude
Outcome	3. Originality of findings on the corruption-growth relationship	3. Does the study report original findings – and NOT report, summarise or interpret existing findings only?	Yes -Include No -Exclude
Study Design	4. Valid study design 5. Robustness check for causality	4. Does the study use a valid design using time-series data, cross-section data, panel data OR simulation? 5. Does the study conduct causality tests or use instrumental variables to address endogeneity and/or reverse causality?	Yes-Include and code No -Exclude Yes-Include No -Exclude

Decision rule: Include if EM and EM2 studies score 5 'yes', exclude otherwise. If excluded, indicate the number of the criteria that the study had failed (1 to 5).

The fifth criterion for empirical (EM) and mixed (EM2) studies is introduced to capture empirical studies that go beyond estimating **only the association** between corruption and growth to find out whether a causal relationship can be established and the causality runs from corruption to growth. This is in line with the review question, which focuses on the 'growth impacts of corruption'.

As stated in Section 1 of the protocol above, the empirical measures of corruption may be influenced by economic growth/development and there may be reverse causality between corruption and growth - both theoretically and empirically. For example, high-growth may lead to lower levels of corruption perceptions (which are used as a measure of corruption intensity) and higher levels of development may enable countries to invest in better-quality institutions, including anti-corruption institutions. Given these complications, we aim to focus on studies that use causality tests or instrumental variables that are widely used in the literature to control for reverse causality or endogeneity problems.

The application of the inclusion/exclusion criteria will be conducted independently by two reviewers (M. Ugur and N. Dasgupta). The reviewers will first conduct a pilot study consisting of 10 studies selected randomly. The decisions on the pilot sample will be compared and convergent/divergent decisions will be noted. Agreement on divergent decisions will be sought through consensus based on prior discussion.

Note: *The inclusion/exclusion criterion no. 5 (robustness checks) may be relaxed and we may include studies that do not control for endogeneity and reverse causality problems. This may be the case if the number of studies in the final sample remains low. If this proves to be the case, the empirical studies that are included despite failing criterion no. 5 will be analysed as a separate group – and their findings will be synthesised as evidence of association/correlation between corruption and growth – rather than as estimates of the growth impact of corruption.*

Presentation of inclusion/exclusion decisions

Information from *EPPI Reviewer* will be retrieved to provide a tabular summary of all included and excluded studies. In the table, included studies will be classified into 2 categories:

- i. **Theoretical/Analytical Studies (TA)** – which will be used for the **narrative synthesis** in the synthesis stage.
- ii. **Empirical Studies (EM and EM2)** – which will be used for the **meta-synthesis** in the synthesis stage.

Excluded studies will have failed to satisfy at least one inclusion criteria. They will be coded such that they can be reported with how many inclusion criteria they failed to satisfy and what these criteria are. For example, an excluded study may have failed to satisfy 2 criteria in Table 2.2.3.2 above and these criteria may have been criteria no. 1 and 3. Then, this study will be coded as 2 (1, 3).

STEP 4: DATA/INFORMATION EXTRACTION

Data extraction is the process through which we obtain the information about study characteristics and findings from included studies. Data extraction will be linked with the evaluation/critical appraisal process, and we will follow the methodology proposed by CRD (2009). One issue in the design of the extraction method is whether or not blinding is necessary for review quality. Although some studies recommend blinding, CRD (2009: 30) reports that blinding does not alter the results of a systematic review despite its high cost in terms of time. Therefore, we will adopt a division of labour between the 2 reviewers, whereby M. Ugur will extract the information and data from all empirical studies (study type **EM** and **EM2**) and N. Dasgupta will extract the information and data from all theoretical/analytical studies (study type **TA**). This division of labour will be facilitated by the fact that studies coded in *EPPI Reviewer* with these codes (as indicated in Step 3 above) can be sorted on that basis easily. Both reviewers will conduct random checks on each other's data/information extraction forms in order to minimise the risk of errors and/or omissions.

The data/information extraction form, a sample of which is presented as **Table 2.2.A1 in Appendix 2.2** below, will be generated from the codes in *EPPI Reviewer* for each study and will include the following information:

- a. Bibliographical information about the study: including record no. in *EPPI Reviewer*, author(s), title, and citation.
- b. Study characteristics information: including study design, study type, type of data used (time-series, cross-country or panel data), and units of measurement for dependent (outcome) and independent variables.
- c. Analytical/estimation methods used: including type of analysis (mathematical/verbal) for study type **TA**, method of estimation for study type **EM** or **EM2** (including fixed- or random-effects regression, linear or non-linear modelling, interaction terms, etc), and number of countries/years in the sample.
- d. Outcomes/results reported: theoretical/analytical conclusions about casual mechanisms and channels in the corruption-growth relationship (for **TA** studies), estimated parameters for all independent variables including interaction terms (for **EM** and **EM2** studies), standard errors of estimated parameters (for **EM** and **EM2** studies), causality/endogeneity test results (for **EM** and **EM2** studies), etc.

The data/information extraction form will not be filled in manually. Instead, this template will be used as a check list for creating 'study control variables' (i.e., categories) in *EPPI Reviewer* for each included study. Having done this, a study record can be generated by pooling together the information in relevant categories.

The codes for study control variables are presented in **Table 2.2.A2** of **Appendix 2.2** – to facilitate tractability and provide an insight into the types of testing, at the meta analysis stage, that we will conduct for the relationship between study characteristics and reported study evidence.

STEP 5: SYNTHESIS

According to CRD (2009: 45), synthesis involves the 'collation, combination and summary of the findings of individual studies included in the systematic review.'

Methods of synthesis can be classified into 2 broad categories: methods for synthesizing quantitative/empirical evidence such as meta-analysis; and methods for synthesizing qualitative evidence, such as narrative synthesis.

As far as meta-analysis is concerned, the method yields meaningful and reliable results if the evidence reported in studies is based on randomised control trials (RCTs). If the reported evidence is not based on RCT data, meta-analysis is not recommended (RDC, 2009: 45; Sauerbrei, 2005).

One limitation of the meta analysis is that it cannot be used to falsify a theory as it does not generate 'new' evidence based on double-blind and controlled trials. In other words, it is mainly a statistical examination of 'scientific studies'. Secondly, the reliability of meta analysis regressions depends on the quality of included studies: a good meta analysis of badly-designed studies generates a 'bad' statistic (Slavin, 1995).

Nevertheless, meta analysis has certain advantages over conventional literature reviews and/or descriptive summaries of research findings. One advantage is that current meta analysis methods enable reviewers to establish the extent to which model specification errors exist in empirical studies and how these errors affect the variation among reported evidence. Another advantage is that meta analysis provides tools for checking for publication bias by clustering studies on the basis of publication type and then plotting Funnel diagrams and conducting Funnel Asymmetry Tests (FAT). Thirdly, meta analysis, despite its shortcomings, is an objective and systematic method for synthesising diverse and often conflicting empirical findings in the literature. In fact, Doucouliagos and Stanley (2007) report that meta analysis results contradict the verdicts of conventional literature reviews and inform more verifiable conclusions.

Given these advantages, meta analysis of economic research findings has been used in several studies as new techniques have been developed to test for the significance of the reported results. For example, Mitchell (2005) uses meta-analysis to synthesize research evidence on the relationship between economic development and human rights. Doucouliagos and Paldam (2009) conduct a meta-analysis of the relationship between international aid and population size of the recipient countries, and whether this relationship between multilateral and bilateral donors. Havranek and Irsova (2009) examine the relationship between firm characteristics and the extent of vertical technology spill-overs generated by foreign direct investment (FDI). (For further studies, see Meta Analysis of Economic Research (MAER) Network website at <http://www.hendrix.edu/maer-network/default.aspx?id=15088>).

Against this background, we will draw on meta analysis techniques to synthesize the empirical evidence on the corruption-growth relationship in a number of ways.

First, we will generate Funnel plots capturing the relationship between the reported estimates and their precision. The clusters for country types, model specification, publication type, country grouping, etc. will be generated from the 'study control variables' listed in Table 2.2.A2 in Appendix 2.2.

- For the whole set of included studies – to capture the tendency of the funnel as precision increases;
- For 2 publication types: journal articles and the rest – to detect whether publication type affects the funnel
- For model specifications (depending on models used) – to detect whether model type affects the funnel;
- For sample/panel sizes – to detect whether sample/panel size affects the funnel; and
- For country groupings (low-income, middle-income, developed countries) – to detect whether country type affects the funnel.

Secondly, we will run meta regressions to test:

- For funnel asymmetry caused by publication (Funnel Asymmetry Test - FAT)
- For genuine empirical effect, regardless of publication selection (Precision Effect Test - PET)

As proposed by Stanley (2008).

Thirdly, we will run meta-regressions to estimate the meta estimates of the corruption coefficient and the coefficients of the control variables capturing publication type, model type, and sample/panel size, and country type.

In addition, we will provide a narrative synthesis of the theoretical explanations for the causal mechanisms and channels through which corruption may affect growth. For this, we will draw on the narrative synthesis methodology proposed by Popay et al (2006) and Rogers et al (2009). Finally, we will map the findings of the meta analysis with those of the narrative synthesis, with a view to identify the scope/need for further research. In this exercise, we will draw on the 'mixed methods synthesis' proposed by Harden and Thomas (2005).

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Appendices

Appendices are numbered according to the section they relate to (e.g., Appendix 1.1 relates to Section 1, etc.)

Appendix 1.1: Authorship of this report

Information will be taken from box on first page, including:

Details of Advisory Group membership:

Dr Anna Walters, DFID

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Acknowledgements

DFID for providing funding for this research

Appendix 1.2:

Table 1.2.A1: List of governance quality data sources, including corruption

1. African Development Bank Country Policy and Institutional Assessments
2. OECD Development Centre African Economic Outlook
3. Afrobarometer
4. Asian Development Bank Country Policy and Institutional Assessments
5. Business Environment & Enterprise Performance Survey
6. Business Environment Risk Intelligence
7. Bertelsmann Transformation Index
8. Global Insight Global Risk Service
9. European Bank for Reconstruction and Development Transition Report
10. Global E-Government Index
11. Economist Intelligence Unit Country Risk Service and Democracy Index
12. Freedom House
13. Transparency International Global Corruption Barometer Survey
14. World Economic Forum Global Competitiveness Survey
15. Global Integrity Index
16. Gallup World Poll
17. Heritage Foundation Index of Economic Freedom
18. Cingranelli Richards Human Rights Database & Political Terror Scale
19. IFAD Rural Sector Performance Assessments
20. iJET Country Security Risk Ratings
21. Institutional Profile Database
22. Latino-Barometro
23. Cerberus Corporate Intelligence Gray Area Dynamics
24. International Research and Exchanges Board Media Sustainability Index
25. International Budget Project Open Budget Initiative
26. World Bank Country Policy and Institutional Assessments
27. Political Economic Risk Consultancy Corruption in Asia
28. Political Risk Services International Country Risk Guide
29. Reporters without Borders Press Freedom Index
30. US State Department's Trafficking in People Report
31. Vanderbilt University Americas Barometer
32. Institute for Management Development World Competitiveness Yearbook
33. Global Insight Business Conditions and Risk Indicators

(Source: Kaufmann et al, 2009: 39)

Table 1.2.A1: World Bank List of Low Income Countries

Afghanistan	Guinea-Bissau	Rwanda
Bangladesh	Haiti	Senegal
Benin	Kenya	Sierra Leone
Burkina Faso	Korea, Dem Rep.	Somalia
Burundi	Kyrgyz Republic	Tajikistan
Cambodia	Lao PDR	Tanzania
Central African Republic	Liberia	Togo
Chad	Madagascar	Uganda
Comoros	Malawi	Uzbekistan
Congo, Dem. Rep	Mali	Vietnam
Eritrea	Mauritania	Yemen, Rep.
Ethiopia	Mozambique	Zambia
Gambia, The	Myanmar	Zimbabwe
Ghana	Nepal	
Guinea	Niger	

http://data.worldbank.org/about/country-classifications/country-and-lending-groups#Low_income

Appendix 2.1: Documentation of search results

The search results for each database and the combined search results will be documented through the search report generated by the database. A trial sample is given below.

Table 2.1.A1: Samples of search result summary

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Appendix 2.2: Documentation of data and information extraction

Table 2.2.A1: Sample of Information/Data Extraction Form

Information/Data Required	Components (to be coded in <i>EPPI Reviewer</i>)
Bibliographical information	<ul style="list-style-type: none"> • Record no. in EPPI Reviewer • Author(s) • Title and citation
Study characteristics	<ul style="list-style-type: none"> • Study type (TA, EM, EM2) • Publication type (journal articles, book chapter, working paper, thesis, report, etc.) • Type of data used (time-series, cross-country or panel data) • Units of measurement for dependent (outcome) and independent variables
Analytical/estimation methods	<ul style="list-style-type: none"> • Type of analysis (mathematical/verbal) for study type TA • Method of estimation for study type EM or EM2 (including fixed- or random-effects regression, linear or non-linear modelling, interaction terms, etc) • Number of countries/years in the sample
Outcomes/results reported	<ul style="list-style-type: none"> • Theoretical/analytical conclusions about casual mechanisms and channels in the corruption-growth relationship (for TA studies) • Estimated parameters for all independent variables including interaction terms (for EM and EM2 studies) • Standard errors of estimated parameters (for EM and EM2 studies) • Causality/endogeneity test results (for EM and EM2 studies)

Table 2.2.A2: Study Control Variables and Codes

Study control variable	Code
A. Publication type	
Theoretical analytical	TA
Purely empirical	EM
Empirical - mixed	EM2
Journal article	J
Book chapter	BC
Book	B
Report	R
Thesis	Th
B. Type of data	
Time series	Ts
Cross-country (no time dimension)	CC
Panel	P
Simulation	S
Sample/panel size	Number
C. Type of estimation	
Linear regression	LR
Non-linear regression	NLR
Fixed effect panel data regression	FE
Random effect panel regression	RE
Number of control variables	Number
D. Interaction terms	
Corruption and country type/level of development	CCT
Corruption and investment channel	CI
Corruption and public finance	
Corruption and human capital investment	CHC
Corruption and governance quality	CGQ