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Executive Summary

The provision of public services and infrastructure is a key factor for economic development and growth. Many developing countries fail to raise the tax revenue required to finance their public sectors. In 2005, the average tax revenue to GDP ratio in the developed world was approximately 35%. In the developing countries, it was equal to 15%, and in the poorest of these countries, the group of low income countries, tax revenue was just 12% of GDP.

Tax avoidance and tax evasion are widely believed to be important factors limiting revenue mobilisation. This study reviews existing empirical estimates of tax gaps, i.e. tax revenue losses due to tax avoidance and tax evasion, in developing countries, and discusses the role of tax expenditures and other determinants of revenue mobilisation.

Existing empirical studies on tax revenue losses due to tax avoidance and tax evasion in developing countries distinguish between a domestic component and an international component. The domestic component includes tax evasion which occurs due to the domestic shadow economy. The international component includes profit shifting by corporations and offshore holdings of financial assets by private individuals.

The most widely cited study of the *domestic component* of tax evasion is Cobham (2005), who *estimates that developing countries lose US-$ 285 billion per year due to tax evasion in the domestic shadow economy*. Cobham's calculation of tax evasion is based on estimates of the size of the domestic shadow economy by Schneider (2005, 2007). This approach has a number of *limitations*. Most importantly, the number derived by Cobham (2005) *should not be interpreted as an increase in tax revenue which could possibly be achieved by better tax enforcement or other policy measures*.

This is not only due to the fact that it is practically impossible to tax all economic activity in the shadow economy. In addition, the measured size of the shadow economy may be a misleading indicator of the tax gap. Firstly, the *size of the shadow economy* may be the *result of deliberate policy choices* made by developing countries. This would imply that, paradoxically, crowding back the shadow economy may neither increase tax revenue nor be in the interest of national welfare. Secondly, shadow economy activities as quantified in the Schneider estimates *include illegal activities* which would be stopped if detected and thus *would not generate tax revenue*. Thirdly, measures of the shadow economy as those provided by Schneider have to be interpreted with caution. Due to the estimation method used, the change of these measures over time is likely to be more informative than the levels of these estimates. But estimates of tax evasion are based on estimates of the levels.

If estimates of the level of tax evasion are based on measures of the size of the shadow economy, the *accuracy of these measures is of key importance*. Cobham (2005) relies on shadow economy estimates based on macro indicators. This approach has the advantage that the data is publicly available. We compare it to other methods to quantify the (domestic) tax gap. These approaches can be broadly divided into i) *macro approaches*, which use data from national accounts and macroeconomic indicators to quantify the tax gap, and ii) *micro approaches*, which use household or firm level data retrieved from surveys and audits. In general, *micro approaches based on information from tax audits of randomly selected taxpayers* are most likely to *deliver reliable tax gap estimates*. In contrast, methods to quantify the domestic tax gap based on macro indicators are *less reliable and informative*. However, data to implement micro methods is seldom available for developing countries.

As existing tax gap estimates for developing countries focus on macro indicator approaches, a possible starting point to improve the information on tax gaps in the developing world would be to use macro methods based on the identification of discrepancies in national accounting data. But in the long run, an appropriate quantification of the tax gap in the developing countries requires research based on *micro approaches, in particular methods which rely on tax audit information collected by the national tax authorities*. Firstly, this would deliver relatively *reliable* tax gap estimates. Secondly, it would allow to calculate *individual components of the*

tax gap according to tax payer groups (e.g. corporations versus individuals, different income classes and sectors of activities) and the type of income which is evaded (e.g. income earned from international and national transactions). The latter provides important and valuable guidance for reforms of the tax administration and the tax system in a developing country.

In a second step, our paper discusses studies which try to quantify the *international component* of the tax gap. Two groups of studies can be distinguished. The first group focuses on the shifting of corporate profits out of developing countries. This activity may include both (legal but undesirable) tax avoidance and (illegal) tax evasion. The most influential studies in this area try to *identify profit shifting by analysing international trade prices*. The basic idea is that prices charged for goods exported to developing countries are distorted upwards whereas prices of goods imported from developing countries are set to artificially low levels, so that income effectively generated in developing countries is shifted to developed economies. According to these studies, trade price distortions may arise with trade between both unrelated parties (where exporter and importer collude) and related parties (within multinational firms). To quantify the tax revenue developing countries lose due to these price distortions, many studies rely on anecdotal evidence or non representative survey data. More sophisticated work in this area based on micro data for trade transactions finds some evidence on systematic price distortions. These are interpreted as reflecting shifting of income from developing countries to industrialised countries like the US and the United Kingdom. *Estimates of revenue losses suffered by developing countries due to corporate profit shifting range between approximately US-$ 35 billion and US-$ 160 billion per year*.

A methodological weakness of the mispricing approach is that it is unclear to which extent price differences simply reflect *quality differences* within a product group. The price patterns observed in the data may just reflect differences in the quality structure of goods produced by countries in different stages of economic development. As long as it is not possible to disentangle quality differences and income shifting, the interpretation of numbers generated by the mispricing approach is difficult.

A *key shortcoming* of many existing studies based on mispricing is that they *only take into account overpriced imports into developing countries and underpriced exports of these countries*. But the mispricing approach also identifies underpriced imports into developing countries and overpriced exports. Both shift income into developing countries. Estimates of tax revenue calculations have to take into account income shifting in *both directions*. If only one direction is taken into account, the results are highly misleading. In this case, *tax revenue losses due to mispricing are overestimated drastically*.

Another issue is the way in which existing studies of profit shifting *translate their estimates of mispricing into tax revenue losses*. Simply multiplying results for income shifted out of developing countries with statutory corporate tax rates neglects the existence of investment incentives like e.g. tax holidays, free enterprise zones and many others. Investment tax incentives are widely used in developing countries. For this reason, less income shifting would not necessarily increase corporate tax revenue in developing countries; part of this income would simply be tax exempt or taxable at very low rates. This aspect also implies that existing studies *overestimate tax revenue losses due to profit shifting*.

The existence of investment tax incentives and the fact that the standard corporate tax rates in developing countries are often lower than those of developed countries, also *question the view that income shifting going from developing directly to developed countries is primarily motivated by taxation*. If it is true that observed trade price patterns at least partly reflect income shifting from developing countries to countries like the US or the UK, this type of income shifting could be driven by forces other than taxation because firms would increase the taxes they pay. Tax motivated income shifting out of developing countries is more likely to be routed through tax havens.

In order to better understand the issue of price distortions and corporate income shifting, it is necessary to *investigate in greater detail whether prices observed reflect quality differences or income shifting*. Clearly, income shifting in *both directions* has to be taken into account. To the extent that income shifting does take place, either through mispricing or other instruments like e.g. debt financing, it is important to investigate *why* income is shifted out of developing countries. In order to achieve this,

it would be possible to *use micro data for multinational firms operating in developing countries*. Such an approach would allow to investigate whether and to what extent taxation, business regulation and institutions like governance structures, property rights and so on contribute to the level of tax revenue levied from taxing firms.

A second group of 'international' studies focuses on *tax evasion by wealthy individuals residing in developing countries* who hold financial assets abroad and do not report this income in their country of fiscal residence. *Estimates of tax revenue losses in developing countries caused by this type of evasion range between US-$ 15 billion per year (this estimate refers to the 1990s) and, for more recent years, US-$124 billion.* These estimates usually start with rough estimates of worldwide financial assets held offshore and then make some ad hoc assumptions on taxable returns, tax rates, and the share of overall assets owned by individuals residing in developing countries. *It is difficult to interpret the results of these calculations*. In this area, there is even less data available than for the corporate sector. In so far, the scope for more informative research seems to be limited.

An issue related to both areas of international tax avoidance and evasion (corporate income shifting and offshore holdings of assets by private individuals) is the special *role of tax havens*. Several studies claim that tax havens cause an important part of the tax gap in the developing world. However, rigorous empirical analysis demonstrating this is scarce. To gain additional insights at least for the corporate sector, it would again be fruitful to use firm data. There are some studies in the literature which, rather than calculating tax gaps, investigate how the presence of a multinational firms in a (regionally close) tax haven country affects the worldwide tax payments of the firm. These studies *suggest that firms operating in tax havens do pay lower taxes than other firms*, but the number of existing studies is still very small.

In addition to tax avoidance and tax evasion, the existence of *tax expenditures*, in particular tax incentives for investment, is widely seen as a reason for tax revenue losses in developing countries. Unfortunately, *internationally comparable data for the extent of existing tax expenditures is not available*. Existing numbers on the volume of tax expenditures reported by various countries are not comparable because they are based on different measurement concepts. While there is *some evidence that the use of*

investment incentives has increased in the last decade, *little is known about the impact of these expenditures on tax revenue and revenue mobilisation*.

As an overall assessment of the literature on tax gap estimates for the developing world, we conclude that the available knowledge on tax revenue losses in developing countries caused by tax evasion and tax avoidance is very limited. This is partly due to the lack of data and partly due to methodological shortcomings of existing studies. Some of the existing estimates of tax revenue losses due to tax avoidance and evasion by firms systematically overestimate the losses. Other studies are based on assumptions which are so restrictive that the results are difficult to interpret. *Overall, it is fair to conclude that most existing estimates of tax revenue losses in developing countries due to evasion and avoidance are not based on reliable methods and data.*

Moreover, it seems that *too much emphasis is put on producing aggregate estimates of tax revenue losses for the developing world as a whole*. While aggregate numbers on the volume of tax avoidance and evasion in developing countries do seem to attract public attention, it should be kept in mind that developing countries are very heterogeneous. Research on tax avoidance and evasion as well as policies to achieve more revenue mobilisation should take this heterogeneity into account. More research is needed to improve our understanding of tax avoidance and evasion and the implications of these activities for revenue mobilization in developing countries. This report includes several suggestions for this research (see table 4 in the report).

1. Introduction: motivation, scope, limitations, structure of the study

The provision of public infrastructure and government services is a key factor for economic development. In many developing countries, a lack of public service provision slows down economic growth and undermines efforts to improve the living standard of the population. There are a number of reasons for the failure of many governments in developing countries to provide sufficient public services. A lack of tax revenue is one of them. In 2005, the average tax revenue to GDP ratio in the developed world was approximately 35%.[1] In the developing countries, it was approximately 15%, and in the poorest of these countries, the group of low income countries, tax revenue was just 12% of GDP.[2] This gap can partly be explained by the fact that demand for public services increases more than proportionally as income rises. But it also reflects weaknesses in the ability of developing countries to raise the revenue required for the provision of adequate public services.[3]

In recent years, the academic and political debate on development finance and development aid has raised the issue that tax avoidance and tax evasion may undermine the ability of developing countries to finance their public sectors. This view is based, among other things, on the perception that the shadow economy in these countries is larger than in the developed world. The term 'shadow economy' has no universally accepted definition. But for the context of taxation and revenue mobilization, a useful definition of the shadow economy would include "unreported income from the production of legal goods and services, either from monetary or barter transactions, hence all economic activities that would generally be taxable, were they reported to the tax authorities" (Schneider and Enste (2000), p.78-79). There is indeed a negative correlation between tax revenue to GDP ratios and some estimates of the size of the shadow economy, although not necessarily estimates based on the definition given above. Many observers conclude from this that a large shadow

[1] OECD Average. Source: OECD Revenue Statistics.
[2] Source: World Development indicators Database, own calculations.
[3] The United Nations Conference on Financing for Development in 2002, which led to the 'Monterrey Consensus', has emphasized the need to mobilize domestic financial sources for development and writes: "An effective, efficient, transparent and accountable system for mobilizing public resources and managing their use by Governments is essential. We recognize the need to secure fiscal sustainability, along with equitable and efficient tax systems and administration…" (UN (2002), p. 4). This has been reaffirmed at the recent Doha Conference on Financing for Development, see UN (2008).

economy actually causes tax revenues to be low. But this view is not uncontroversial. Firstly, many activities are summarized under the heading "shadow economy", and not all of these activities are linked to tax evasion. Secondly, as will be explained in greater detail further below, there is empirical research on the relationship between tax revenues and the estimated size of the shadow economy which leads to different conclusions.

A number of recent publications have related the revenue losses due to tax avoidance and tax evasion in developing countries to the financial support these countries receive through development aid. Many of these contributions conclude that aid dependency could be reduced significantly if developing countries succeeded in crowding back tax avoidance and evasion. Reducing aid dependency could have a number of advantages. First, many aid projects require complementary spending like e.g. spending on maintenance by the recipient. A lack of complementary resources may reduce the effectiveness of development aid.[4] Second, development aid is more volatile than domestic tax revenue. Third, more domestic revenue mobilisation rather than reliance on aid is seen as a means to increase political participation of the domestic population in public sector decisions. Fourth, the focus of development aid is partly determined by the donors and may differ from priorities as seen by the developing countries themselves.[5]

Besides issues of tax compliance, unsatisfactory revenue mobilisation may also be caused by flaws in the structure of the tax system itself, in particular the inappropriate use of tax expenditures. Tax expenditures are widely criticised as policy instruments which lack transparency and which are difficult to control. They are thought to be vulnerable to lobbying by special interest groups and even corrupt practices. Therefore, strategies to control tax expenditures may be an important element in a broader strategy for improving revenue mobilisation in developing countries.

This report provides a survey of existing studies on tax avoidance and tax evasion as well as tax expenditures in developing countries. We focus on quantitative studies and

[4] Of course, one could also argue that this encourages revenue mobilisation. Gupta (2007) analyses tax revenue in developing countries and finds a positive correlation between aid and domestic tax revenue raised.
[5] See e.g. Gupta and Tareq (2008).

discuss the approaches and methods used and try to relate and put into perspective the different estimates. The existing studies may broadly be divided into two groups. The first group of studies focuses on tax evasion and tax avoidance related to domestic economic activity. The second group of studies focuses on tax evasion and tax avoidance related to international economic activity.

Due to limited data availability, studies of domestic tax evasion and tax avoidance in developing countries are typically based on macro indicators of the size of the shadow economy or the informal sector und try to estimate the tax gap, i.e., the revenue losses due to avoidance and evasion, using essentially what might be referred to as back of the envelope calculations. These approaches do not necessarily lead to outcomes which are biased upwards or downwards. But they are based on a large number of strong assumptions, so that their results are difficult to interpret. We compare these approaches to other methods of tax gap analysis, which are usually applied to industrialised countries. These are more informative and reliable, but they also require more data. For this reason, they cannot easily be applied to developing countries

We then turn to studies trying to measure tax avoidance and tax evasion related to international economic activity. In this area some studies focus on tax evasion and tax avoidance by (multinational) firms through trade mispricing while others deal with income from portfolio investments of private individuals held offshore. The issue of tax avoidance and evasion involving tax havens and offshore financial centres is currently high on the political agenda not just in the development context but also for developed countries.[6] Efforts to quantify the tax gap caused by these international activities also have to rely on limited data and are therefore based on rather strong and partly ad hoc assumptions. Again, the precision of the estimates is questionable. This also applies to studies on tax evasion through financial assets held offshore. As we will explain further below, some of the studies on corporate profit shifting systematically overestimate revenue losses due to tax evasion.

[6] See e.g. the G20 group declared at their London Summit in April 2009 that they agree "to take action against noncooperative jurisdictions, including tax havens." (G 20 Leaders Statement 'The Global Plan for Recovery and Reform', London, April 2, 2009, No 15).

Finally, this paper tries to identify areas for further research. Despite the limitations in the availability of data for developing countries, which are difficult to overcome, we identify a number of areas where promising research on different aspects of tax revenue mobilisation in developing countries is possible. This applies, in particular, to the international component of tax evasion.

The setup of the report is as follows. In section 2, we summarize the methods and findings of existing quantitative studies in tax avoidance and tax evasion and discuss tax gap analyses which are primarily used in developed countries to assess potentials for tax revenue mobilisation. In section 3 we focus on the question of how political and administrative contexts affect tax evasion and tax compliance. Section 4 deals with the specific issue of tax expenditures. Section 5 summarizes our findings, identifies possible areas for future research and concludes.

2. Tax Avoidance and Evasion in Developing Countries

Universally accepted definitions of tax avoidance and tax evasion do not exist. Tax authorities like HMRC define tax avoidance as an activity that a person or a business may undertake to reduce their tax in a way that runs counter to the spirit and the purpose of the law, without being strictly illegal. The HMRC has defined a set of "signposts" which include e.g. "transactions or arrangements which have little or no 'economic' substance or which have tax consequences not commensurate with the change in a taxpayer's (or a group of related taxpayers') economic position"[7]. Tax evasion, in contrast, is usually defined as a violation of the law (see also Slemrod and Yitzaki, 2002).

2.1. Components of Tax Avoidance and Tax Evasion

Tax revenue losses due to tax avoidance and tax evasion can occur for a number of reasons. Existing estimates of these revenue losses distinguish between a domestic and an international component of tax avoidance and tax evasion.[8] The domestic

[7] http://www.hmrc.gov.uk/avoidance/aag-risk-assessing.htm.
[8] Making this distinction is also useful in terms of policy conclusions because dealing with domestic as opposed to international tax evasion requires different policy solutions.

component of tax evasion and avoidance would include, for instance, non-declared or under-reported income from work or domestic business activities. The international component of tax avoidance and evasion includes practices like transfer price manipulation by multinational firms or the holding of financial assets in offshore bank accounts by private individuals with the purpose of concealing capital income.

Drawing the line between legal (but undesirable) tax avoidance and illegal tax evasion is sometimes difficult. One way of distinguishing the two would be to argue, along the lines of the definitions given at the beginning of section 2., that tax avoidance comprises activities which exploit loopholes in the tax system but run counter to the purpose of the law whereas tax evasion describes illegal activities that involve elements of concealment.[9] From this perspective, non-declaration or underreporting of income, which characterizes the shadow economy, would clearly be classified as tax evasion. This would also apply to income from financial assets held abroad and not reported to domestic tax authorities. International income shifting by firms may include both tax avoidance and tax evasion. For instance, multinational firms have to set transfer prices for intra firm trade in order to separate profits generated in different countries. There will always be some room for choices which firms may exploit to reduce their tax burden. Using this room is not necessarily a violation of the law, so that this would be classified as tax avoidance.[10] This also applies to the location of immaterial assets like e.g. patents in low tax countries or the use of intra firm debt and other financial instruments to shift income from one country to another. But practices which involve crass mispricing or faked transactions in order to reduce tax payments would have to be classified as tax evasion.

In the following, we will discuss various estimates of tax revenue losses due to tax evasion and avoidance. The numbers produced by these estimates are often uniformly referred to as tax gaps. From a policy perspective, however, it is important to distinguish between, on the one hand, the revenue which would be raised if all economic activity which currently escapes taxation were taxed and, on the other hand, the additional tax revenue which could be raised if measures against tax avoidance

[9] See e.g. Kay (1980), cited in Slemrod and Yitzaki (2002).
[10] Shome and Tanzi (1993) report that in some countries like e.g. India, "the courts have considered tax avoidance with the intention of evading taxation as tax evasion."(Ibid. footnote 2, p.808). This suggests that drawing the line between the two is not always easy.

and evasion were taken. While the former is merely a hypothetical tax gap, the latter is more relevant to tax policy. But determining the latter gap requires information not just about the magnitude of avoidance and evasion but also about expected reactions to policy measures trying to improve compliance and the costs of these policy measures. Most of the studies we discuss below refer to the first type of gap and have to be interpreted accordingly. We will return to these issues below.

2.2. Estimates of tax avoidance and tax evasion in developing countries

Quantitative estimates of the tax revenue lost due to tax avoidance and evasion face the difficulty that, due to the nature of these activities, they escape normal statistical registration and documentation. Attempts to estimate the amount of tax avoidance and tax evasion therefore have to build on concepts which exploit correlations between observable and statistically documented variables and evasion. Estimates for developing countries face the additional challenge that the availability of economic data in general is much more restricted than in developed countries. These data problems may explain why there is very little reliable empirical evidence on tax avoidance and evasion in developing countries. The existing studies mostly rely on highly restrictive assumptions and have to make use of data of mixed quality.

In the following, we discuss existing estimates of tax avoidance and tax evasion. We start with a recent study by Cobham (2005), which focuses on tax evasion, rather than avoidance. We do so for the following reasons. Firstly, this is a frequently cited paper. Secondly, Cobham (2005) is transparent about the approach used, so that his results can, in principle, be replicated using publicly available data. Thirdly, most studies on tax evasion and avoidance in developing countries focus on the international component only whereas Cobham (2005) addresses the combined impact of domestic and international tax evasion, with a focus on the domestic component.

2.2.1. The Cobham (2005)-Approach

Cobham (2005) calculates the overall level of tax revenue lost due to tax evasion in developing countries to be equal to roughly US-$ 385 billion per year. US-$ 285 billion are estimated to be the result of domestic evasion, US-$ 50 billion are related to international profit shifting by corporations (Cobham refers to Oxfam (2000) as the source for this number) and another US-$ 50 billion are related to tax evasion through offshore holdings of financial assets (Cobham takes this number from TJN (2005))[11]. Cobham (2005) considers the following stylised model of tax evasion: Assume that the hypothetical tax revenue of a country in the absence of tax evasion (T_0) is given by

$$T_0 = t\Omega$$

where t is some average tax rate and Ω is the overall economic activity, which is assumed to be equivalent to the tax base. Starting from this benchmark, Cobham discusses five reasons for tax revenue losses:

1. the domestic shadow economy,
2. foreign asset holdings of domestic residents,
3. income shifting by multinational firms,
4. tax competition which drives down tax rates, and
5. non-payment of taxes which are due but which are not collected for several reasons like e.g. shortcomings of the tax administration.

As mentioned above, for the international components 2. and 3., Cobham (2005) refers to estimates by other authors. The contribution of Cobham (2005) is to estimate the first component: tax revenue losses due to tax evasion by the domestic shadow economy. This is done in the following way: Assume that the share of the shadow economy in overall economic activity is given by a proportional factor denoted by s, so that the actual tax base is given by

$$T_1 = t\Omega(1-s)$$

Cobham then defines the tax revenue lost due to domestic shadow economy activities as $T_0 - T_1 = t\Omega s$

This difference is estimated as follows

[11] Adding these two numbers involves some double counting, as we explain further below. The validity of the estimates in Oxfam (2000) and TJN (2005) is discussed in section 2.2.4.

$$Est[T_0 - T_1] = \text{Tax Revenue to GDP Ratio} \times \text{GDP} \times \text{Share of the Shadow Economy in GDP.} \quad \text{(x)}$$

This approach raises a number of issues. Most importantly, the hypothetical tax gap calculated by Cobham cannot be interpreted as a potential revenue increase which could be achieved if efforts were undertaken to crowd back the shadow economy (as pointed out by Cobham (2005)). The main reason for this, apart from the various limitations of the overall estimation approach, is that no such policy would lead to a situation where the entire shadow economy complies. In particular, to the extent that the shadow economy includes illegal activities, these activities would be prohibited, not taxed. Moreover, even if this could be achieved, people would change their behaviour if they were taxed. On balance, economic activity would be likely to decline. Cobham (2005) argues that a 'realistic' goal might be to reduce the difference of the size of the shadow economy in developing countries (on average just over 30% of official GDP in the dataset he uses) to that of developed countries (approximately 13% of official GDP) by two thirds. This would imply that the size of the shadow economy in developing countries would be reduced by approximately 12 percentage points. On this basis Cobham (2005) estimates that tax revenue in developing countries could be raised by US-$ 110 billion per year (see table 3 in Cobham (2005)).

2.2.2. A Critical Assessment of the Cobham Estimate

Cobham's (2005) study is an innovative and important contribution to the debate on revenue mobilisation in developing economies. Nevertheless, it raises a number of issues with respect to the estimation approach, the data used and the interpretation of the results.

For example, the number of US-$ 100 billion of revenue losses due to tax evasion (and possibly also avoidance) through international channels calculated by Cobham on the basis of Oxfam (2000) and TJN (2005) is not entirely consistent. Precisely, the way in which these studies are combined gives rise to double counting. The US-$ 50

billion taken from Oxfam (2000) already include tax revenue losses due to offshore holdings of financial assets (see Oxfam (2000), p.10). Adding the TJN (2005) number[12], which refers to offshore holdings of financial assets, too, implies that this component of tax evasion is counted twice. But this is only a marginal point in Cobham's analysis, and we will come back to these estimates of the international component in section 2.2.4.

Cobham's main contribution is to estimate the domestic component of tax evasion. In the following, we will focus on this component. We will discuss Cobham's conceptual modelling strategy and assess the shadow economy estimates used in Cobham's analysis, which are taken from Schneider (2005). We will discuss the estimation methodology used in Schneider (2005) and contrast it with other commonly employed methods to quantify income hidden from the tax authorities.

2.2.2.1. Discussion of the Conceptual Framework

Cobham's study assumes that income generated in the shadow economy enhances the national tax gap because this income would be taxed by the government if perfect tax auditing was possible. This approach has recently been criticised by Auriol and Warlters (2005). They argue that many developing countries deliberately create costs of entry into the formal economy in order to reduce competition and create economic rents, which may then be taxed. According to their view, the size of the shadow economy is endogenous, a result of tax policy trying to adjust to the specific difficulties of raising tax revenues in developing countries. Auriol and Warlters (2005) show in their empirical analysis that the negative correlation between the size of the shadow economy and tax revenue ratios disappears if the endogeneity of the shadow economy is taken into account.

But even if one accepts the idea that a large shadow economy may cause tax revenue to decline, the approach used by Cobham (2005) raises a number of questions. Firstly, the tax system is summarized by what could be interpreted as a proportional tax on

[12] The TJN (2005) estimate refers to worldwide offshore holding of financial assets and the tax revenue losses caused by this, which are calculated to be US-$ 255 billion. Cobham assumes that the share of developing countries in this number is equivalent to their share in worldwide GDP, which is roughly 20%, hence the US-$ 50 billion.

gross domestic product. This abstracts from the structure of tax system (direct vs indirect taxes, tariffs vs value added taxes and so on). Implicitly this suggests that shadow economy activities, if they were transmitted to the legal economy, would be taxable at the same average tax rate as activities in the official sector. However, the structure of shadow economy activities may vary from the structure of activities in the official economy. Therefore the hypothetical tax burden between the two sectors might deviate. In addition, most imports will have been subject to tariffs even if they go to the informal sector, and VAT is not refundable to informal sector businesses.

Secondly, as mentioned above, the approach assumes that economic behaviour is given and will not adjust if tax enforcement changes. However, if individuals are taxed, their incentives to invest and provide effort and investment may decline. Economic activity may therefore be scaled back if it is drawn into the official economy. Of course, there are also arguments claiming that firms operating in the shadow economy are restricted with respect to growth since they cannot expand beyond a certain size without attracting the attention of the tax authorities. According to this view, bringing firms into the official economy might enhance the tax base and thus mitigate the effect described above.

Third, administrative and compliance costs, which have an impact on revenue that can be raised, are neglected. If these costs are high, crowding back the shadow economy may reduce rather than increase revenue available for financing public services. Fourth, there are also some issues regarding the consistency of the approach and the relationship between the measurement concept and the data used which are left open in Cobham (2005). One important question that arises is whether the approach takes into account that GDP as reported in the WDI data includes part of the economic activity which evades taxation. The international standards of the Systems of National Accounts (SNA) stipulate that shadow economy activities are included in GDP calculations (see e.g. OECD (2002)). But estimates as those of Schneider (2005, 2007) refer to that part of the shadow economy which is not taken into account in GDP statistics (ibid, p. 6). Cobham (2005) does not distinguish between economic activity which evades taxation but enters GDP statistics and economic activity which is neither taxed nor included in GDP statistics.

To clarify this, assume that GDP as measured statistically is given by $\Omega(1-s)$. The shadow economy shares reported in Schneider (2007) are expressed as a percentage of this statistically measured, "official" GDP. Assume further that a share *e* of measured GDP evades taxation. In this case, tax revenue would be given by $t\Omega(1-s)(1-e)$ and the tax revenue lost due to the existence of the two types of shadow economy would be $t\Omega(s+e(1-s))$.

What does this imply for the numbers produced by equation (x)? The measured tax revenue to GDP ratio would be given by $t\Omega(1-s)(1-e)/\Omega(1-s) = t(1-e)$. The ratios reported by Schneider (2007) are equal to $s/(1-s)$. Inserting this into equation (x) yields

$Est[T_0 - T_1] =$ Tax Revenue to GDP Ratio

×GDP

×Share of the Shadow Economy in GDP (x*)

$= t\Omega s(1-e)$

Comparing this to the "true" tax revenue loss $t\Omega(s(1-e)+e)$ shows that, by neglecting that statistically measured GDP includes part of the shadow economy, the measure used in Cobham (2005) potentially understates the tax revenue losses due to the existence of the shadow economy. Of course, correcting for this would require data on the size of the shadow economy which is included in GDP, which is not readily available.

2.2.2.2. Quantification of the Shadow Economy

Cobham's tax gap calculation relies on the validity and precision of the shadow economy estimates derived in Schneider (2005), as well as the relevance of the shadow economy as measured by Schneider for the particular issue of tax evasion. As mentioned in the introduction, only part of what is normally considered as belonging to the shadow economy would be taxed if it was reported to the public administration. Some activities, in particular criminal activities, would be stopped. We will come back to this issue below. In the following, we will shortly sketch and discuss

Schneider's estimation approach and the derived estimates and will relate them to other work in the literature.

Schneider's shadow economy estimates are calculated on the basis of the so called "Multiple Indicator Multiple Cause" (MIMIC) approach. The MIMIC approach is a structural equation model which captures the statistical relationship between a latent (unobservable) variable (here: the shadow economy) and manifested (observed) variables. The approach consists of two sets of equations, a structural equation and a measurement equation. The structural equation links the latent variable, i.e. the shadow economy, to a set of observable variables which influence the latent variable, for example the tax burden. The measurement equation in turn relates the latent variable to the indicators. As causal variables which determine the shadow economy Schneider (2005) employs the share of direct and indirect taxation in GDP, the burden of state regulation and state interference, the unemployment quota and GDP per capita. As indicator variables employment, the annual growth rate of GDP and the annual growth rate of local currency per capita are used.[13] Formally, the approach is described by

$$\eta = \gamma' x + \xi$$
$$y = \lambda \eta + \varepsilon$$

where η is the size of the shadow economy, x represents the determinants of the shadow economy and y stands for observable indicators which are influenced by the size of the shadow economy. The variables ζ and ε are normally distributed and mutually independent error components. The model can be solved for the reduced form of a function of the observable variables:

$$y = \lambda(\gamma' x + \zeta) + \varepsilon = \Pi' x + v \text{, with} \qquad \Pi = \gamma\lambda' \quad \text{and} \quad v = \lambda\zeta + \varepsilon .$$

[13] The presumption is that the shadow economy impacts on all three indicator variables: if the shadow economy increases official employment and official GDP are predicted to decline, while the cash demand (conditional on the amount of official transactions in the economy) is predicted to increase since much of the informal economy transactions is assumed to be undertaken in cash.

Thus, in the econometric estimation procedure only Π is determined. Since the latent variable is not observed, only an index (as opposed to an absolute value) of the latent variable can be obtained through the estimation model. This index is arbitrary in so far as it depends on normalizations made by the researcher. To relate the index to real variables like GDP one must estimate (or otherwise obtain) the size of the shadow economy for one certain year, a 'base year'. The size of the shadow economy for all other years can then be extrapolated from the index. Therefore, the *level* of the shadow economy is not derived from the MIMIC model, but only the change of the *time path* (see Beusch, 2005; OECD, 2002). Thus, a quantification of the shadow economy based on the MIMIC model relies on the validity of the reference value. As Beusch (2005, p. 35) writes:

"An external estimate is used to anchor the series, so that the growth rates from the MIMIC model are converted into a time series of the level of the underground economy as a percentage of recorded GDP. The overall level of the final product of Dell'Anno and Schneider is due entirely to this external estimate, since only the variations up and down from the anchor point come from the MIMIC model. The anchor value of 19.7 percent […] is obtained as the simple average of five other estimates by various methods (one of which is itself the average of two others). Most of these prior estimates come from an unpublished working paper by Schneider and Enste (2000), where they are documented as 'own calculations'."

Analogous problems apply with respect to the shadow economy estimates in Schneider (2005) which provide the basis for Cobham's tax gap estimations. To derive the benchmark estimate Schneider claims to use "available estimates from the currency demand approach in combination with the DYMIMIC approach" (p. 606). The benchmark estimates and thus the calculations for the level of the shadow economy hinge on results from the currency demand approach.

The currency demand method builds on the idea that a substantial fraction of the underground activity relies on cash to avoid detection by tax officials. Thus, the approach quantifies an "excess cash" demand beyond the cash demand that can be explained by transactions in the official economy and exploits this estimate to derive a measure for the size of the shadow economy. For a detailed description of the currency demand method, see section 2.2.3.2. Here, we would just like to point out that the currency demand method has been strongly criticized by many authors in the literature on several grounds. The OECD (2002, p. 190) states:

"Monetary methods are unsuitable for estimating the underground economy […]. The crucial assumption underlying the […] cash demand methods is that a change in the size of the underground economy is caused by changes in taxation and the size of government regulations and that this becomes visible through changes in the demand for cash because underground transactions are mainly paid in cash. This assumption may not be tested and may not be true."

Since the currency demand approach delivers the reference value for the level of the shadow economy, the results of the MIMIC approach reflect the shortcomings of the currency demand model. These shortcomings may explain that the results from the MIMIC model are not very robust. Several authors stress the sensitivity of the results with respect to minor sample changes and adjustments in the set of indicator and cause variables (see e.g. La Porta and Shleifer, 2008). Schneider (2007) himself admits that his results are sensitive along several dimensions. This gives rise to doubts concerning the precision of the Schneider-results, especially since for developing countries the described methodological problems may be exacerbated by data of questionable quality.

Another relevant shortcoming of the approach is that the estimates of the shadow economy include not only legal activities but also illegal activities related e.g. to drug trade. These activities would be stopped by the national authorities if they were detected and therefore would not generate tax revenue. For this reason, tax gap calculations made by tax authorities in the developed world usually try to exclude the illegal sector of the economy (see e.g. IRS homepage, Swedish Tax Agency, 2008).

Moreover, exploiting the estimates in Schneider (2005) for the calculation of a national tax gap gives rise to conceptual difficulties. As described above, the Schneider-estimates for the level of the shadow economy largely depend on the currency demand approach. This cash demand approach, however, is designed to capture shadow economy transactions with a *national* dimension only, like e.g. non-declared work income. Tax avoidance and evasion through international channels (like e.g. transferring income out of a country though the distortion of international trade prices) is not captured by the currency demand model since these transactions are unlikely to be undertaken using (national) cash.[14]

[14] Cobham (2005) is aware of this difficulty and adjusts his tax gap measures for an international component.

It is useful to contrast the MIMIC approach employed in the Schneider article with alternative approaches found in the literature. In the following, we will give a brief overview over methods most commonly used to quantify the national tax gap in the developed countries. Subsequently, we will shortly discuss the prerequisites and necessary conditions to make these approaches applicable to countries in the developing world. We will include tax gap estimates by both academic researchers and national tax authorities. Tax authorities usually have access to the best data sources to produce reliable tax gap estimates. Countries which estimate and publish information on various types of tax gaps are France, UK, Sweden and the US. Sweden and the US provide the most detailed tax gap estimates. They provide a whole map of estimates for different tax instruments. Both countries also publish an estimate of the *overall* national tax gap. France and the UK provide estimates of the VAT gap. The UK currently also develops estimates for the calculation of the corporate tax gap.[15]

2.2.3 Alternative Approaches to Quantify the Tax Gap

2.2.3.1. Definition of the Tax Gap

In order to understand the accuracy of different approaches to quantify the tax gap, it is helpful to distinguish different components of this gap. As mentioned in section 2.1., the tax gap is commonly defined as the difference between the tax which would be raised under a hypothetical, perfect enforcement of tax laws and the actual tax payments. Thus, a tax gap may arise, firstly, due to assessment risk, which comprises the difference between the tax which is due and the tax actually billed to the tax payer. The assessment risk thus reflects both underreporting of income and the non-filing of returns. Secondly, a tax gap may arise due to collection risk which is captured by the difference between tax payments received and the tax actually billed to the tax payer. It thus reflects the underpayment of taxes which are billed to the tax payer. The major fraction of the tax gap is caused by the underreporting of income and non-filing of returns (around 90% of the overall tax gap in developed economies) while under-payment hardly contributes to the total tax gap (around 10% of the overall tax gap). The latter largely reflects accidental non-compliance and is mostly

[15] An overview over different methods to calculate tax gaps can also be found in Shome and Tanzi (1993).

caused by employer failures to withhold income and employment taxes (see e.g. US Department of Treasury, 2006)

In general, attempts to quantify the tax gap can be divided in two broad methodological categories: macro and micro approaches. Macro approaches either exploit macroeconomic indicators or information from a country's national and financial accounts to identify discrepancies that can only be explained by the presence of economic activities which are not reported to or not observed by the national tax authorities. Micro methods rely on data retrieved from individual tax payers and use a bottom-up approach to derive estimates for the tax gap in the economy as a whole. In the following, we will shortly present the most widely used macro and micro methods to quantify the tax gap.

2.2.3.2. Macro Approaches to Tax Gap Estimation

Methodologically, macro approaches can be split into two sub-categories. The first category comprises procedures which rely on macro indicator variables like monetary and physical input demand to determine the overall size of non-recorded transactions. The second category comprises procedures which exploit information from national and financial accounts to determine the tax gap.

a) The Currency Demand Method

The most widely used approach in the first category is the currency demand method which was initially proposed by Cagan (1958) and Gutmann (1977) and was further developed by Tanzi (1983) who econometrically estimated the shadow economy in the US. The idea behind the currency demand approach is that many of the activities in the shadow economy involve cash payments in order to avoid leaving traces which could lead to detection by tax authorities. Moreover, the degree to which activities are shifted into the unofficial sector is assumed to be determined by the level of taxation and the complexity of the tax system. Thus, the authors build a time series estimation model in which the "excess" demand for currency is explained by the average tax rate and an indicator for the complexity of the tax system as proxies for changes in the

shadow economy. The estimation equation controls for other potential determinants of cash demand like GDP per capita and the interest rate on savings deposits.

The coefficient estimates for the tax rate measures are interpreted to capture changes in the size of the shadow economy in the wake of changes in the tax burden or the tax complexity. Moreover, the papers derive estimates for the size of the shadow economy by labelling one of the observation periods as the base year. Under the additional assumption that the income velocity in the shadow economy equals the money velocity in the official sector, it is then straightforward to derive an estimate for the size of the shadow economy.

Despite their popularity monetary methods have also been heavily criticized on various grounds. The OECD (2002, p.190) expresses considerable scepticism in writing:

> "Monetary macro-models are unsuitable for estimating the underground economy primarily because they are based on modelling assumptions that cannot be justified. […]
>
> The problems with these models are evidenced by the sensitivity of the results to the benchmark year assumptions, the wide range of results that different methods give under the same circumstances, and the implausible results that are obtained in certain cases."

As mentioned by the OECD, the assumption of a base year is open to criticism. The same is true for the assumption of the same velocity of money in the shadow and the official economy. Other authors have additionally questioned the credibility of the currency demand approach by showing that a substantial fraction of shadow economy activities does not involve cash payments (around 30%). With respect to developing countries, an additional flaw of the currency demand approach is that, according to anecdotal evidence, a substantial fraction of the transactions in the shadow economy is not undertaken in the national currency but in US-$.

b) Physical Input Method

The second approach to estimating the shadow economy based on macro indicators is the Physical Input Method. The idea behind this approach is that electric power consumption is a good indicator for overall economic activity. This can be justified by

the fact that the electricity to GDP elasticity is usually estimated to be close to 1. The seminal paper which popularized this approach is Kauffman and Kalibera (1996) who use electricity consumption as a proxy for the overall economy and then substract from this overall measure an estimate for the official GDP which provides them with an estimate for the unofficial GDP in the economy. This approach, too, has however received a lot of critical reviews, mainly since not all shadow economy activities require a considerable amount of electricity and technical progress has made the use of electricity more efficient in both the official and unofficial economy. This may spoil the estimates.

Strictly speaking the MIMIC approach also belongs to the category of macro methods. However, as clarified above, the MIMIC method just determines an *index* for the variation in the shadow economy over time (for a detailed description of the model, see Section 2.2.2.2.). To derive the size of the shadow economy a benchmark estimate for one year is needed from which the size of the shadow economy in the other years can be extrapolated. Consequently, the MIMIC estimates are just as good as this benchmark estimate which is often retrieved using the cash demand method. As noted above, the cash demand method has been criticized for a number of reasons, and this critique consequently also applies to the MIMIC approach.

c) Macro Accounting Methods

Macro accounting approaches identify tax gaps by comparing data from national and financial accounts of countries. The underlying idea is that discrepancies in these accounts can plausibly only be explained by tax evasion and avoidance behaviour. In contrast to the Money Demand Approaches and the Physical Input Demand Approaches described above, which try to determine the *overall* size of the shadow economy in a country, approaches based on discrepancies in the national statistics aim at determining tax gaps for specific tax instruments.

An example for tax gap studies based on national accounts is the identification of concealed income through a comparison between the national household income statistic and the national household expenditure statistic. If household expenditure

considerably exceeds reported household income, this discrepancy is assigned to shadow economy activities.

Moreover, macro accounting methods can also be used to calculate the tax gap from non-declared savings income. To do so, tax authorities make use of the fact that household savings are calculated differently in the national and the financial accounts. The national accounts comprise a measurement of what is produced. This income is distributed between labour and capital. Financial savings can be derived from that as disposable income minus consumption and real investment. In financial accounts, in contrast, financial savings are computed from how savings are invested, i.e. financial savings are calculated as the sum of transactions in financial assets minus the sum of transactions in liabilities. The calculation of the latter is based on material from financial institutions. Household saving is taken to be the actual saving figure in the national accounts while the financial accounting figure may fail to include everything, especially savings invested abroad (see Swedish Tax Agency, 2008).

Discrepancies between accounting figures may also partly be driven by statistical reasons and an insufficient data quality. The Swedish tax authority thus admits that it is not "impossible that there are shortcomings in the statistical basis of the National Accounts which might mean that the absolute limit calculated is too big or too small" (Swedish Tax Agency, 2008). Another often raised concern with respect to macro methods based on national accounts is that their application has some potential for an overlap in the calculation of the tax gap. For example, the undeclared sale of a service increases the VAT gap, but it also generates hidden income from work and therefore increases the income tax gap. In this case, there is however the danger of double counting, as the undeclared VAT would normally be deducted from the income of the individual and would therefore reduce her income tax liability.

Moreover, all macro methods (those based on macro indicators as well as those based on national accounting information) have the disadvantage that they produce aggregate information on the tax gap only. To determine why taxes are evaded and to find appropriate measures to improve tax administration and to bring the activities from the shadow economy into the official sector, a detailed split up of the evaded taxes by tax payer groups would be required.

In general, accounting methods are better accepted than methods based on shadow economy estimates using the Money Demand, Physical Input Demand and related methods. This is reflected in the fact that several tax authorities in the developed world make use of accounting methods to determine part of their national tax gap. The Swedish Tax Agency, for example, calculates both, the work income tax gap and the saving income tax gap according to the macro methods described above (augmented by other approaches).

2.2.3.3. Micro Approaches to Tax Gap Estimation

Due to the shortcomings of macro approaches, many researchers and administrators strongly prefer to rely on tax gap estimations which are based on micro methods (see e.g. Slemrod and Yitzhaki, 2002). Micro methods exploit data on individual tax payers and either rely on surveys or on information retrieved from tax audits.

a) Survey Methods

Like all micro approaches, survey methods are rather costly and are therefore not widely used, especially not in developing countries. We are aware of only a small number of exceptions. De Paula and Scheinkman (2008) exploit a comprehensive survey of small entrepreneurs (employing less than five employees) in Brazil and find that only 13% of these entrepreneurs operate in the formal sector in the sense that they are registered with the tax authority. La Porta and Shleifer (2008) exploit survey data in which business leaders from (registered firms) in various countries were asked to estimate the size of the informal economy. Obviously, this measure can only represent a rough estimate of the informal economy since it is based on personal experience and anecdotal evidence only.

In developed economies, tax authorities also rely on survey methods to determine the size of the tax gap. Thus, the Swedish tax authority, for example, sends out questionnaires to corporations and individuals about their activities and transactions and undertakes surveys of particular sectors and occurrences (see Swedish Tax Agency, 2008). The disadvantage of surveying tax payers directly of course lies in

the dependency of the data quality on the willingness of respondents to answer questions truthfully. Especially with respect to the topic of tax evasion and avoidance, there may be considerable doubts as to which extent interviewees confess fraudulent behaviour. Thus, the results from these kind of surveys are perceived to be very sensitive to the way the questionnaire is formulated (see e.g. Mogensen et al., 1995; Schneider, 2007).

b) Tax Audit Methods

Besides the survey method, tax authorities most widely use a tax audit method to determine (part of) the national tax gap. Ideally, such a tax gap investigation is based on a random and controlled sampling process. The sampled tax payers are then surveyed by the tax authority, which carries out a detailed risk assessment with respect to the tax payer's evasion activities. Since the tax authorities do not necessarily observe all concealed income, a 'controllable' tax gap rather than a 'true' tax gap is identified by that procedure. If the sampling process was random, it is straightforward to extrapolate the information retrieved in the tax audits to the whole tax payer population.

Audit approaches have been especially popular to determine the tax gap for income taxes. The US, for example, has undertaken audit studies to quantify the income tax gap since the 1980s. During the 1980s comprehensive research programs based on representative tax payer samples were conducted in order to determine the tax compliance behaviour of different tax payer groups. Since the program was stopped in 1988, tax authorities extrapolated the results on taxpayer compliance behaviour to the following years under the assumption that the non-compliance across tax payer groups remained unchanged. In 2001, the US government set up a new program to measure tax payer compliance: the National Research Program (NRP). Similar to its predecessor the NRP is based on a large sample of 46,000 tax returns which were randomly selected for review and examination. Using sample weights according to tax payer characteristics the information gained from the audits and non-compliance behaviour of the randomly drawn tax payer sample is then extrapolated to the rest of the population and aggregated.

Nevertheless, since undertaking a micro study based on random audits is costly and time consuming, studies using audit methods are often not based on random audits but rely on voluntary or operating audits (see e.g. the income tax gap calculations of US states). Voluntary audits introduce severe sample selection problems since the tax payers who volunteer to be audited are likely to be those who do not evade taxes. In contrast, if the population of the audited firms and individuals is not random but based on the operating audits, i.e. the audits carried out by the tax authorities in their normal work, then the tax gap is likely to be overestimated. The reason is that the tax authorities try to audit those tax payers who are most likely to evade taxes.

Economic research has, however, developed procedures to control for this sample selection bias and to obtain non-biased estimates in the presence of a non-random sampling process. Precisely, these studies use econometric specifications and techniques to jointly estimate the probability that a return is audited and the amount of income prone to non-compliance. From this approach an unbiased estimation for the overall tax gap can be derived, see e.g. Erard and Feinstein (2001), Erard and Ho (2002).

Thus, one may conclude that micro methods are generally perceived to retrieve reliable tax gap estimates. Since survey methods suffer from problems related to the subjectivity in the answers, it is in many respects information retrieved from tax audits which is considered to lead to the best tax gap estimates. Apart from that, a major advantage of these micro methods is that they allow to split the tax gap according to tax payer groups (e.g. corporations vs individuals, different income classes and sectors of activities) and the type of income which is evaded (e.g. income earned from international and national transactions). Consequently, they provide valuable information for the tax authorities to optimize their auditing process.[16]

[16] Note that some tax gap approaches are a mixture between micro and macro methods. This is for example true for the determination of the value added tax gap which is a major component of the total tax gap in many countries. Approaches to measure the VAT gap commonly start from a macroeconomic perspective and aim to determine the production flows from the national accounts to estimate from this the total national consumption of goods and services. From this a hypothetical VAT is constructed which would have been paid if all goods were correctly labelled and filed with the tax authority. This figure can then be compared with the amount of VAT actually collected. However, since the VAT rates and deductions differ between different types of products and services, the size of the VAT gap cannot be calculated by purely relying on macro methods. In addition, a detailed split-up

2.2.3.3. Comparison between Schneider/Cobham Estimates and other Tax Gap Studies

The previous section has presented several methods to determine the fraction of income which escapes taxation. Since Cobham's calculations of the tax gap is based on the MIMIC model, which is controversial as described above, it is interesting to compare these estimates to results derived by alternative estimation methods. We do so in two steps. As a first step, we compare the estimates of the size of the shadow economy by Schneider (2005, 2007) to other estimates of the shadow economy. As a second step, we compare the tax gaps calculated as by Cobham (2005) on the basis of the Schneider–estimates of the shadow economy to results of national tax gap studies for the US and Sweden which are based on the tax audit approach.

a) Comparing estimates of the size of the shadow economy

Since shadow economy estimates for developing countries are scarce, we have to rely on a small number of available sources. The description thus closely follows a recent paper by La Porta and Shleifer (2008) who collected shadow economy size estimates for the developing world including, among others, estimates by Schneider (2007).

La Porta and Shleifer (2008) group their country-level estimates for the size of the shadow economy into four quartiles according to the country's GDP per capita. The Schneider estimates presented in La Porta and Shleifer (2008) are depicted in Table 1. They suggest that the size of the shadow economy is 42.3% of the official GDP in the first quartile of the poorest countries, 39.8% of the official GDP in the second quartile and 34.1 % of the official GDP in the third quartile. This closely resembles unweighted averages of shadow economy estimates for the groups of low income, lower middle income and upper middle income countries in Schneider (2005).

- Table 1 here -

---

of the types of goods and services is required. This is only possible at the micro level, for instance by exploiting information provided by input-output statistics.

These Schneider-results can now be compared to estimates for the size of the shadow economy from different sources. The second column in Table 1 depicts estimates based on the Physical Input approach presented in Section 2. It quantifies the shadow economy by employing the amount of electricity consumption as a proxy for the total GDP (comprising the official and the inofficial sector). The estimates are taken from Friedman et al. (2001) and are very similar to the numbers retrieved from the Schneider approach. As discussed above, both estimation methodologies have been heavily criticized in the past.

The third column includes estimates for the shadow economy based on survey data. The data is taken from the Executive Opinion Survey which is presented in the World Competitiveness Report of the World Economic Forum. In this survey business leaders from 125 countries were asked to estimate the size of the informal sector in their country using a 1 to 7 scale, where 1 indicates that more than 50% of the economic activity is unrecorded and 7 that all business is registered. To make the results comparable to the other shadow economy measures, La Porta and Shleifer rescale the index on a scale of the shadow economy from 0% to 50% of official GDP. As the authors point out, this cut-off value of 50% is arbitrary and introduces a downward bias in this measure of the shadow economy. The estimates for the shadow economy are found to be somewhat lower than with the Schneider approach suggesting that in the lowest quartile of countries the size of the shadow economy is 35.4% of official GDP, in the second quartile 33.7 % of official GDP and in the third quartile 27.8 % of official GDP.

Moreover, La Porta and Shleifer report a second survey-based measure for the shadow economy of countries around the world which is based on the World Bank Enterprise Survey. The respondents to the survey are managers of registered companies in (mostly) developing countries. The managers were asked to estimate the percentage of total sales that a typical establishment reports for tax purposes. This measure does not directly correspond to the estimates which determine the shadow economy in percent of official GDP for two reasons: first, the question is restricted to the shadow economy in the corporate sector and does not account for tax evasions by other tax payer types and second, the measure focuses on non-declared sales rather than non-declared corporate income which is sales minus input factor costs. However,

if one is willing to assume that shadow activities in the corporate and in the private sector of the economy do not substantially deviate and that the percentage of sales hidden is a good proxy for the percentage of activities in other corporate areas which are hidden from the authorities, this approach would represent a meaningful estimate for the overall size of the shadow economy. Unfortunately, however, one can by no means be sure that these assumptions are satisfied. The estimates in Table 2 are reported to be somewhat smaller than with the Schneider approach.

Columns 4 and 5 present two additional proxies for the shadow economy in developing countries, specifically the number of registered firms per thousand inhabitants and the percentage of self-employment in the non-agricultural sector. Intuitively, a low percentage of registered firms and a high percentage of self-employment are interpreted as indicating a decisive role of the shadow economy. Although the estimates are structurally different and not directly comparable to the Schneider results, they suggest that the shadow economy plays an important role in developing countries.

Thus, we may conclude that estimates based on survey and macro approaches are shown to lead to estimates which are roughly comparable to the results of Schneider (2005) with respect to the absolute size of the shadow economy. Accounting for the fact that other estimates obtain somewhat smaller results would only slightly diminish the tax gap calculated in Cobham (2005).

However, it is nevertheless important to bear in mind that all of the approaches presented in La Porta and Shleifer (2008) have been criticized heavily with respect to their methodology. Accordingly, using them for tax gap estimates does not necessarily lead to better estimates. Unfortunately, shadow economy estimates which rely on the most widely accepted tax audit method are, to the best of our knowledge, not (publicly) available for developing countries.

b) Comparing Tax Gap Estimates

Despite the fact that the two approaches differ in many respects, it is instructive to compare the tax gap calculation based on the Schneider estimates of the shadow

economy to tax gap estimates based on the audit method in developed economies. Since comprehensive tax gap estimates based on random audits (augmented by other approaches) are determined by the US and the Swedish tax authority, we will use these two countries for this exercise.

The Swedish Tax Agency determines the size of the total Swedish tax gap with Swedish Krona 133 billion (around US-$ 16 billion), which is equivalent to 5 per cent of GDP or 10% of the tax determined. Since the fraction of the tax gap which is caused by evasion activities through international channels accounts for 35% of the tax gap (see Swedish National Tax Agency, 2008), the tax gap estimate assigned to national evasion activities is determined with around US-$ 10.4 billion. Since the Schneider-estimates plausibly capture national evasion activities only (see our argumentation above), we compare the MIMIC results for Sweden to the benchmark of US-$ 10.4 billion. Schneider (2005) quantifies the shadow economy in Sweden in 2000 at 19.1 % of official GDP. To determine the tax gap in 2006, we collect data for the tax revenues as a percentage of overall GDP (=21.26%) and the total GDP in current US-$ (= US-$ 384 billion) from the WDI data base and assume that the size of the shadow economy remained unchanged at the level of 19.1% of official GDP until 2006. Following the Schneider estimate, this derives a tax gap of US-$ 15.6 billion, which is considerably larger than the estimate by the Swedish National Tax Authority. Accounting for updated shadow economy estimates in Schneider (2007) where the Swedish shadow economy is determined with 18.3% leads to a tax gap of US-$ 14.9 billion and brings the Schneider/Cobham result somewhat closer the estimate of the Swedish Tax Agency.

As a next step, we redo the same exercise for the US. For 2001, the National Research Program has quantified the overall tax gap in the US to a gross gap of US-$ 345 billion whereas US-$ 55 billion were recovered via audits and late payments which leaves a net tax gap of US-$ 290 billion. Note that this number only includes federal taxes. State and local taxes and social security contributions are neglected. From this figure, the non-compliance as a percentage of the total estimated taxes owed was determined with 16.6%. According to the Schneider estimates, the shadow economy in the US represents around 8.7% of official GDP. Following the Schneider/Cobham approach and retrieving US tax revenue as a percentage of GDP from the WDI data

base (=12.71%) and total US GDP in US-$ (=11.1 trillion) derives a tax gap estimate of US-$ 111.37 billion which is just 38% of the net tax gap estimate presented by the IRS. Nevertheless, one has to bear in mind that the IRS estimate includes tax evasion through international channels while the Schneider/Cobham approach is unlikely to capture those. Unfortunately, the IRS does not separately derive the tax gap which is caused by international activities but assuming a fraction comparable to the Swedish estimates of 35% would still result in a considerable gap between the IRS result and the Schneider/Cobham estimates.

In general one has to bear in mind that the scope of the tax gap estimates according to Schneider (2005) and according to the national tax authorities in the US and Sweden is quite different. While the Schneider estimates e.g. partly capture illegal activities, they are not accounted for in the tax authority estimates. This may explain part of the excess tax gap estimation for the Swedish case but cannot rationalize the shortfall for the US case.

Summing up, this section suggests that tax gap calculations based on estimates of the shadow economy are unlikely to reveal appropriate results on the amount of income evading taxation. The magnitude of the Schneider estimates is similar to estimates generated by other macroeconomic approaches. But comparing the tax gaps calculations based on these numbers to estimates derived from micro methods leads to considerable deviations, at least for developed countries. This suggests that more research is required to understand the tax gap in developing countries.

A starting point may be to apply macro methods based on national accounting data to retrieve estimations for the size of the tax gap in developing countries. Despite some restrictions, the IMF data base on Government Financial Statistics and the World Development Indicator data may contain appropriate information. However, since these approaches build on reliable accounting data which may in many cases be of low quality for developing countries[17], such attempts probably also face difficulties. Thus, we think that in the long run an appropriate quantification of the tax gap in the

[17] One issue is that subnational taxes are often not included in the statistics.

developing nations would require investigations based on tax audit information collected by the national tax agencies.

2.2.4. Tax Avoidance and Tax Evasion through International Channels

Most existing research argues that tax revenue losses of developing countries due to international activities occur through two channels: the first channel is trade price distortions and other types of corporate profit shifting activity (like e.g. thin capitalization or the location of immaterial assets in low tax jurisdictions) and the second channel exists due to offshore wealth holdings of domestic residents. Both activities may reduce the tax revenue collected by developing countries. The former reduces the tax base for corporate taxation while the latter reduces the personal income tax base. In the following, we will first discuss estimates for tax revenue losses through corporate profit shifting activities and then turn to estimates for tax revenue losses due to foreign wealth holdings by private individuals.

2.2.4.1. Tax avoidance and tax evasion through corporate profit shifting

The estimates of profit shifting out of developing countries which currently dominate the public debate essentially use two approaches. The first is to look at stocks of foreign direct investment and to calculate hypothetical rates of returns and, on this basis, hypothetical tax revenues. These can be compared to the tax revenue actually observed. The second approach focuses on measuring profit shifting through what is perceived as mispricing in international trade.[18]

a) Profit shifting and FDI stocks

Oxfam (2000) estimates that corporate profits shifted out of developing countries are equal to US-$ 50 billion per year. This number is calculated as follows. Oxfam multiplies the FDI stock in developing countries (US-$ 1219 billion in 1998, retrieved from UNCTAD, 1999) with a Worldbank estimate for the return on FDI in developing

[18] Other measures used to identify concealed capital movements use inconsistencies or unexplained residuals in balance of payments data, see e.g. the discussion in Boyrie et al (2005). Studies on profit shifting in developed countries also focus on debt as a profit shifting device. This is also a major concern among governments, as reflected in the widespread use of thin capitalisation rules.

countries of 16 to 18%. The authors argue that the true estimate for the return on FDI is even higher since the Worldbank figure does not account for profit shifting activities. Thus, they set the rate of return to 20%. Next, the paper assumes an average tax rate of 35% and thus derives a hypothetical corporate tax payment of around US-$ 85 billion. Since the actual tax payments received are around US-$ 50 billion, according to Oxfam (2000),[19] this leaves a tax gap of US-$ 35 billion. Oxfam (2000) augments this figure with revenue foregone due to the evasion of income from financial assets held abroad, which is estimated to equal US-$ 15 billion (see also section 2.2.4.2.). This leads to the figure of tax revenue losses of US-$ 50 billion.

This approach raises a number of issues. Firstly, an important weakness of this calculation is to assume that, with perfect compliance, all income from foreign direct investment would be taxed at a rate of 35%. In 1998, the average corporate tax rate in the OECD was close to 35%. The average corporate tax rate of developing countries was closer to 30%[20], as Oxfam (2000) recognizes, but the key issue is that this approach neglects the existence of tax incentives for corporate investment. As discussed in section 4 of this report, many developing countries use tax incentives like e.g. tax holidays or free economic zones which offer low or zero corporate taxes. It may well be the case that these incentives are sometimes inefficient from an economic policy point of view, but their revenue impact should be distinguished from the impact of tax avoidance and evasion. Neglecting this implies that the revenue losses due to evasion and avoidance are overestimated significantly.

Secondly, the return on FDI is not identical with the corporate tax base. For instance, if foreign direct investment is financed by debt, it cannot be expected that the contribution of the investment to the corporate tax rate will be 20% of this investment because interest is deductible from the tax base.

[19] The source for this number is missing in Oxfam (2000).
[20] KPMG (1998) reports an average corporate income tax rate of 35.67 % for OECD countries, 32.30% for non-OECD Asian-Pacific countries and 32.03% for Latin American countries.

b) Trade Mispricing

Another literature which estimates tax revenue losses through border crossing activities of firms starts with what is referred to as illicit financial flows. The probably best known work on capital flows out of developing countries through business channels is Raymond Baker's book *Capitalism's Achilles Heel: Dirty Money and How to Renew the Free-Market system.* There, he quantifies the yearly illicit financial flows out of developing countries through the business sector at US-$ 500 to 800 billion.

The book provides a break-down of this number into different activities. The analysis claims that slightly above 60% of these financial flows can be ascribed to legal commercial activities whereas the rest is assigned to criminal activity. Since illegal activities, if detected, are expected to be stopped, we focus on legally earned income which leaves the country. Baker argues that money earned on legal commercial activities leaves developing countries through three potential channels: the mispricing of goods traded between independent parties, the distortion of transfer prices charged on goods traded within a multinational firm, and fake transactions.

b1) Trade mispricing between unrelated parties

With respect to mispricing between third parties, Baker bases his estimate on 550 interviews he conducted in the early 1990s with officials from trading companies in 11 countries: the United States, the United Kingdom, France, Netherlands, Germany, Italy, Brazil, India, South Korea, Taiwan and Hong Kong. Since Baker assured anonymity, he does not make the data publicly available but argues that the data contains appropriate information on trading practices.

He reports that the interviewees confirmed collusion between importers and exporters to draw money out of developing countries to be common practice. Specifically, he states that "mispricing in order to generate kickbacks into foreign bank accounts was treated as a well-understood and normal part of transactions" (p.169) by the interviewed managers. As a result of this study, Baker estimates that 50% of foreign trade transactions with Latin American countries are mispriced by on average around

10% adding to a worldwide average mispricing of goods traded between third parties of 5%. Similar, slightly larger figures are reported for countries in Africa and Asia suggesting mispricing of 5% to 7%.

Baker quantifies the taxation base which is lost to developing countries through mispricing activities by multiplying the low end of his mispricing estimate (i.e. mispricing of 5% of import and export value respectively) with the sum of imports and exports of developing countries, which is quantified with US-$ 4 trillion. He thus arrives at what he refers to as a lower-bound estimate of capital outflows due to trade of US-$ 200 billion.[21] Note that the international trade figure of 4 trillion approximates the sum of the value of exports and imports in goods and services for low and middle income countries of the year 2003 (see the WDI data base). However, trade activities with the developing world increased further and the value of the sum of exports and imports from and to low and middle income countries consequently surged to US-$ 9 trillion in 2007 (see WDI data base). Thus, extrapolating Baker's estimates to recent years would suggest even higher outflows of the developing world due to mispricing.

Baker's approach to determine price distortions in the trade between unrelated parties is, although apparently stringent in its application, based on a relatively small number of interviews. Nevertheless, his results are broadly consistent with findings of a small set of other papers in the literature that have addressed the mispricing of international trade between third parties.

Among these papers, Pak (2007) is the most widely cited one. He identifies abnormally priced import and export transactions through a so-called "price filter matrix". Using micro data on trade transactions, he constructs the price filter by calculating the median price, the upper quartile price, and lower quartile price for each harmonized commodity code (i.e. each product group) by country using import and export data bases of the customs agency of each country. Alternatively, the mean and the standard deviation of the price distribution may be calculated. From this, Pak derives an upper and a lower bound of “normal” prices for a certain transaction to

[21] This number includes third-party and related-party trade. The latter will be discussed further below.

determine whether the price of a given import or export transaction is abnormally high or low.

Pak (2007) broadly supports Baker's estimates for the case of the US by suggesting that income is transferred toward the US through mispricing activities. Precisely, he finds that the value of US imports from all other countries around the world was underreported by approximately US-$ 202 billion in 2005, or 12.1% of total imports, and the value of US exports to all other countries around the world in the same year was overreported by $ 50 billion or 5.5% of total exports. The estimates are thus quantitatively comparable to the findings of Baker (2005). The same is true for other papers. Zdanowicz et al. (1999) for example investigate the international merchandise statistics between the US and Brazil and find that the amount of income shifted due to abnormal pricing is between 11.13% for under-invoiced exports from Brazil and 15.23 % for overinvoiced imports to Brazil. Pak et al. (2003) use the same framework to investigate capital outflows from Greece due to mispricing of internationally traded goods and services. The percentage of income shifted from Greece to the world varies between 2.04% for underinvoiced exports from Greece and 5.88% for overinvoiced imports to Greece.

Global Financial Integrity (2009) employs similar methods to quantify (a fraction of) trade misinvoicing activities by which profits are shifted out of the developing world and report that, in the period between 2002 and 2006, US-$ 371.4 billion per year have been shifted out of developing countries through trade mispricing (GFI (2009), p.6). Another study using this approach has been published recently by Christian Aid (2009). They argue that profit shifting out of developing countries through trade mispricing in the period 2005-2007 was above one trillion US-$ (Christian Aid (2009), p.5), giving rise to a yearly tax revenue loss of US-$ 121.8 billion per year.[22] Using the same approach, Christian Aid (2008) calculate a tax revenue loss to the developing countries due to trade mispricing of US-$ 160 billion in 2008.

[22] Some of these estimates are also referred to in TJN (2007,2009).

While the estimates for trade mispricing seem to be rather consistent across studies[23], it should be noted that this approach raises a number of questions. Most importantly, there are some fundamental concerns about the basic method. Firstly, identifying the highest and the lowest quartile of observed prices as abnormal prices implies that *any* price distribution would be diagnosed to include overpricing and underpricing, even if the observed price differences are small.

Secondly, it is unclear to which extent price differences simply reflect *quality differences* within a product group.[24] If there are price differences within product groups, it would be natural to assume that developing countries tend to export low-end/low-price products whereas developed countries export high-end products with higher prices. Chinese exports are an example for this pattern, as recently demonstrated by Schott (2008). How this affects the results of income shifting calculations depends on whether or not trade volumes of different countries in a given product group are considered jointly to identify mispricing. If they are considered jointly, and if the quality pattern is as described above, the mispricing approach systematically overestimates income shifting from developing to developed countries. If they are considered separately, this cannot happen, but in this case goods which are classified as overpriced in one country may be counted as underpriced in another country. This seems inconsistent. As long as it is not possible to disentangle quality differences and income shifting, the interpretation of numbers generated by the mispricing approach is difficult.

Thirdly, the hypothetical tax revenue losses calculated in the studies on trade mispricing do not take into account the existence of tax incentives like free enterprise zones, where imports and exports are usually free from tariffs and taxes and corporate taxes are low or equal to zero. In this case, mispricing which shifts income from developing countries to developed countries like the US or the UK actually increases worldwide tax revenue.

[23] Splitting the estimation results for trade mispricing behaviour between sets of countries reveals a rather large variability in the estimates, though, leading partly to very high estimates which can hardly be reconciled through anecdotal evidence (see e.g. Pak, 2007, Table 2).

[24] Pak (2007, p.119) does mention that "Abnormally priced imports and exports may be due to heterogeneity of products within a given harmonized commodity code classification…" but does not discuss this issue further.

The most important issue, however, is how the mispricing approach is used to calculate income shifting. Many studies only take into account underpriced exports from and overpriced imports into developing countries, i.e. overpriced exports and underpriced imports, which shift income in the opposite direction, are neglected. For instance, Pak (2007) reports underpriced imports into the US (table 2 p. 121) and overpriced US exports (table 3, p.122), but overpriced imports and underpriced exports (both of which would shift income out of the US) are not reported. A similar approach is used by Christian Aid (2009) and other studies. It is clear that estimates of tax revenue losses suffered by developing countries based on this approach, which neglects half of the income shifting in the data, are misleading. The tax revenue losses are clearly overestimated.

Finally, one should also note that the existing analysis is purely descriptive in nature. It may not be taxation which *causes* the capital outflow from developing countries. Other factors like e.g. economic and political uncertainty, fiscal deficits, financial repression, devaluation and the threat of expropriation and potential confiscation of wealth and taxes may be the real driving forces (Boyrie et al., 2005). Thus, a shortcoming of the existing estimates is that they reveal nothing about the reason for the capital outflow from the developing world.

More precisely, given that the studies suggest that trade mispricing gives rise to capital flows into developed economies with comparatively high tax rates (like e.g. the US), the question arises why this mispricing occurs. From a taxation perspective, one would even expect capital to be shifted out of high-tax countries in the developed world to developing countries with lower tax rates[25] or, due to tax incentives for investment, much lower tax rates.[26] It may also be the case that trade prices reported in trade statistics are not the same as prices firms report for purposes of taxation. Alternatively, income could be shifted to tax havens, from both developing and developed countries. But all this cannot be detected using the standard trade

[25] Corporate tax rates in developing countries are not always lower than those of developed countries. For instance, many African countries have different rates for different sectors, with top rates of approximately 35% (Angola, Sudan, Tunisia, Zambia) or even 40% (Libya), see KPMG (2008).
[26] Pak (2007) even states an example of US importers who overpaid for scrap gold to send capital to Mexiko to reduce their taxable income in the United States. This story of capital flowing out of the US for tax reasons, however, does not seem to prevail in the aggregated trade price data.

mispricing approach.[27] We will discuss the role of tax havens further in section 2.2.4.3.

b2) Trade mispricing between related parties

In a second step, Baker (2005) investigates the distortion of transfer prices between related parties, i.e. between the different affiliates belonging to the same multinational firm. Baker admits that he has not done a formal investigation of transfer pricing between multinational affiliates. Thus, he bases his estimation on anecdotal evidence that he gathered from various sources: "I have, however, observed enough transactions, seen enough exaggerated intracompany prices, asked enough questions in dozens of countries, and collected and reviewed more than enough trade data to have every reason to conclude that, on a global scale, abusive transfer pricing between affiliates greatly exceeds mispricing between unaffiliated entities" (p. 171). To keep his estimates conservative, he projects the volume of trade mispricing for trade between unrelated parties to trade between related parties. As mentioned above, both add up to a volume of US-$ 200 billion.

A decisive shortcoming of Baker's approach is again its basis upon anecdotal evidence only and its purely descriptive nature. It would be interesting to know to what extent taxation has a causal negative effect on the mispricing of goods and services traded within multinational firms. It is important to understand *why* capital is moving out of a country to advice developing countries in their policy reforms. The causal effect of corporate taxes on the distortions of intra-firm transfer prices has been investigated by a growing empirical literature for Europe and the US but these studies unfortunately hardly account for potential profit shifting activities in the developing world. Two exceptions are Mutti and Grubert (2004) and Azemar and Corcos (2008)

[27] Clausing (2003) investigates tax motivated transfer price distortions by comparing intrafirm trade prices to prices of goods traded between different firms. This approach builds on the assumption that tax motivated income shifting can be expected to take place within multinational firms but not across different firms.

who present evidence which is broadly in line with transfer price distorting behaviour of multinationals in the developing world (see also the discussion in Section 3).[28]

c) Other forms of profit shifting

Besides trade mispricing activities, Baker (2005) also stresses that a substantial fraction of capital flows across borders are fake transactions like e.g. billing and receiving payments for goods and services which were never delivered. These estimates, however, are again just based on anecdotal evidence and cannot be replicated. The quantified amount of US-$ 150 billion lost through this type of activity is therefore, again, difficult to interpret.

The estimates in Baker (2005) thus suggest that the amount of capital leaving the developing countries through mispricing of international trade and fake transactions sums up to around US-$ 350 billions per year. It is important to note that this is a very rough estimate which presumes that all these cross-border flows effectively leave the developing world. Moreover, as has been discussed above in the context of related studies, interpreting mispricing as income shifting may be misleading altogether because price differences are likely to reflect quality differences. In addition, tax incentives like free enterprise zones are not taken into account, so that the estimated tax revenue losses are overstated. Given this, and given the strong assumptions underlying these numbers and the problems with respect to data quality, the interpretation of the estimates of corporate profit shifting by Baker (2005) and similar studies is difficult.

2.2.4.2. Tax avoidance and tax evasion due to foreign wealth holdings of private individuals

[28] In this context, it may also be important to note that multinational companies may not only relocate profits within their multinational group through adjustments in international transfer prices but also through the distortion in the debt-equity structure of the firm. Several papers give evidence on profit shifting activities by means of adjustments in the capital structure for the developed world (see e.g. Buettner and Wamser, 2007).

A number of authors claim that developing countries lose significant amounts of tax because wealthy individuals hold financial assets in other countries, possibly tax havens, and do not declare the income from these investments to the tax authorities in their countries of residence. To the extent that developing countries tax the income of their residents on a worldwide basis, the non-declaration of income from foreign wealth holdings is a violation of the law and thus a form of tax evasion. It may also be the case that the national income tax laws of developing countries offer loopholes in so that certain forms of investments in offshore financial assets might be considered tax avoidance, rather than evasion. For instance, if developing countries exempt the foreign source income of corporations from tax, as do many OECD countries, without combining this with appropriate anti avoidance legislation, taxpayers may hold financial assets through offshore corporations and avoid domestic taxation without explicitly breaking the tax law.

Estimating the amount of tax revenue lost due to offshore holdings of financial assets by private individuals is even more difficult than estimating revenue losses through profit shifting by firms because transactions by private individuals largely escape statistical registration.

A widely cited estimate of the revenue losses due to offshore holdings of financial assets has been published by the Tax Justice Network (TJN, 2005). TJN starts with estimates of global wealth in financial assets published by Banks and Consultancy Firms (a report by Merril Lynch and Cap Gemini for 1998 and a report by Boston Consulting Group from 2003). This is combined with estimates of the share of financial assets held offshore by the Bank for International Settlement (which refers to US asset holdings, though). By combining these numbers, TJN (2005) claims that offshore holdings of financial assets are approximately US-$ 9.5 trillion. This is augmented by US-$ 2 trillion of non-financial wealth held offshore like e.g. real estate (no source is given for this number). On this basis, TJN (2005) estimates that globally approximately US-$ 11.5 trillion of assets are held offshore. Assuming an average return on these assets of 7.5 percent implies that these offshore assets yield a return of US-$ 860 billion. Moreover, the TJN assumes that these assets are taxable at 30% and thus calculates a revenue loss of US-$ 255 billion per year (in 2005).

The analysis in TJN (2005) makes no statements as to which part of these revenue losses occur in developing countries. Cobham (2005) uses the TJN (2005) results and estimates the share of developing countries as follows: Since 20% of worldwide GDP is accounted for by middle and low-income countries and given that offshore wealth holdings are not less likely in the developing world, 20% of the revenue loss can be assigned to these countries, i.e. US-$ 51 billion.[29]

Clearly, these are rough back-of-the envelope calculations based on ad hoc assumptions on taxable rates of return and the distribution of asset holdings which, again, cannot be verified. Other estimates of these revenue losses use similar methods. Oxfam (2000) calculates revenue losses due to evasion of income from financial assets held abroad of around US-$ 15 billion per year. This result is mainly driven by an outdated estimate for foreign asset holdings of residents in developing countries from 1990 (US-$ 700 billion). Oxfam (2009) estimates that US-$ 6.2 trillion of developing country wealth is held offshore by individuals. This leads to an estimated annual tax loss to developing countries of between US-$ 64 - 124 billion.

Overall, it is difficult to interpret the existing estimates for tax revenue losses due to offshore wealth holdings, not because they unambiguously over- or underestimate the revenue losses but because they rely on a large number of strong assumptions. These include what seem to be ad hoc assumptions on the distribution of asset holdings across the developed and the developing world as well as taxable rates of return and average tax rates. In addition, there are several open questions which have to be addressed. First, for the income from offshore wealth holdings to represent income that is hidden from tax authorities in the developing world it has to be taxable on a residence basis. Some developing countries, however, do not tax the foreign source income of residents because it may not be administratively efficient to do so (Howard

[29] Thus, the Cobham estimate implies offshore asset holdings from developing countries of US-$ 2.3 trillion (= 20% * US-$ 11.5 trillion). Note that this can be considered as an upper end estimate given that other studies have quantified the capital flight from developing countries with US-$ 1.3 trillion (Hermes et al., 2002) and US-$ 0.8-1.0 trillion (GFI, 2009). Nevertheless, note that again a direct comparison of the numbers is problematic since they comprise different time periods and are calculated based on different methodologies. A detailed description of the estimation methodologies used and a critique of the approaches would go beyond the scope of our paper. For a detailed survey on the topic, see Hermes et al. (2002). Moreover, in general the estimates for a capital flight from the developing world may comprise both, capital flight of businesses and private individuals.

(2001), p. 259). Second, even if savings income is taxable on a residence basis, taxes paid in the source country may be deductible from tax in the residence country. Third, it is unlikely that all income from financial assets held offshore evades taxation in the country of residence of the owners. There are other than tax reasons for offshore holdings of financial assets.

Fourth, many tax systems provide various exemptions for capital income, which include e.g. tax exemptions for retirement saving. Neglecting this leads to an overestimate of tax revenue losses. From a policy perspective, it is important to note that residence based taxes on offshore financial income are known to be hard to enforce, even for developed countries. Thus, closing the tax gap may be associated with substantial administrative costs. It clearly requires international cooperation like e.g. information exchange. With this in mind, here again it may be urgent to understand the (non-tax) determinants of offshore wealth holdings, i.e. to understand why wealth is held abroad. Without a clear understanding of these reasons, it is unlikely that policy recommendations for reforms in developing countries can be made in a meaningful way.[30] A more detailed discussion of this issue can be found in Section 3.

2.2.4.3. The role of tax havens

Since many authors have assigned a special role to tax havens in explaining the revenue losses suffered by non-haven countries in the developing world, this section summarizes empirical work on the impact of tax havens on the tax revenues in developing countries.[31] Tax havens may affect revenue mobilisation of other countries in several ways. In particular, they may be recipients of income shifted out of high tax jurisdictions in the developing and the developed world. Moreover, they

[30] Hermes et al. (2002) cite a set of studies which suggest that the outflow of capital from developing countries is driven by macroeconomic and political instability.

[31] One issue that arises here is that the definition of the term 'tax haven' is controversial (as other definitions used in the report). Dharmapala and Hines (2006) define tax havens very broadly as "locations with very low tax rates and other tax attributes which appeal to foreign investors" (ibid., p.1). This definition would include many countries, including major OECD countries who offer very attractive regimes for particular types of investors.

may induce other countries to cut their taxes, i.e. they may intensify tax competition.[32]

TJN (2009) claims that 60% of all global trade is routed through tax havens. The origin of this number is unclear, though. Sawicky (2005) reports that in 2001, Manhattan District Attorney Robert M. Morgenthau testified before the U.S. Senate that, among off-shore tax havens, Grand Cayman alone has $800 billion in U.S. dollar deposits, and that amount was increasing by US-$ 120 billion annually.

NGOs like Oxfam (2000) claim that developing countries as a whole may be foregoing annual tax revenues of at least US-$ 50 billion as a result of tax competition and the use of tax havens (p.6). Oxfam argues that "tax competition, and the implied threat of relocation, has forced developing countries to progressively lower corporate tax rates on foreign investors. Ten years ago these rates were typically in the range of 30-35 per cent- broadly equivalent to the prevailing rate in most OECD countries. Today, few developing countries apply corporate tax rates in excess of 20 per cent. Efficiency considerations account for only a small part of this shift, suggesting that tax competition has been a central consideration. If developing countries were applying OECD corporate tax rates their revenues would be at least US-$ 50 billion higher."[33]

We are sceptical about these lines of arguments and think that caution is warranted with respect to assigning potential tax losses to the presence of tax havens. The last years have seen an increasing mobility of capital which drove down the corporate tax rates, not only in the developing world but also in developed economies (see e.g. Devereux, 2007). There are some studies which indicate investment in developing economies to be more sensitive to taxation than investments in developed countries. This would make them particularly vulnerable to tax competition in the wake of increased capital mobility. However, we think that it is non-trivial to determine which part of a reduction in the corporate tax rate and which fraction of losses in corporate tax revenues can be assigned to the presence of tax havens.

[32] Whether this is the case is controversial, see Keen (2001) and Hong and Smart (2006).
[33] Another estimate by Weyzig and van Dijk (2008) claims that the tax haven features of the Netherlands alone lead to a loss of more than € 100 million to developing countries.

Here, further research is needed to e.g. determine the causal effect of the presence in tax haven countries on tax revenues paid by multinational affiliates in the developing world. Such an investigation should follow work by Desai et al. (2006a, 2006b) and Maffini (2009) who undertook similar studies for the US and the European Union (see also our discussion in Section 5).

3. Political, Social and Administrative Determinants of the Tax Gap

As noted above, it is important to understand *why* tax gaps in developing countries arise because it is difficult to derive policy conclusions without understanding the determinants of tax gaps. In the following, we will summarize the findings of a small number of papers which address this question.

The empirical literature has identified a set of potential determinants of the tax gap in developing countries. One strand of the literature proposes that firms operate in the underground economy (and consequently add to the tax gap) due to weaknesses in political and social institutions like bureaucracy, over-regulation, corruption and a weak legal system (see e.g. Friedman et al. 2000). Several authors refer to this phenomenon as the politicization of economic life in which corrupt officials gain some residual control rights over firms that operate in the official sector.

> "Such control rights might include regulatory powers over […] private firms, the ability to regulate and restrict entry, control over the use of land and real estate that private businesses occupy, the determination and collection of taxes on businesses, the rights to inspect firms and close them if regulations are violated […]. Typically, many politicians use these rights to pursue their own interests, such as maintaining employment in certain firms, supporting politically friendly and punishing politically unfriendly entrepreneurs, and subsidizing their allies. Politicians can also use these rights to enrich themselves by offering firms relief from regulation in exchange for bribes." (Johnson et al. 1999, p.2)

To avoid the exposure to this kind of "extortionate and arbitrary demands" (Friedman et al. 2000), firms have an incentive to leave the official economy and to work in the

unofficial sector. Empirical evidence commonly confirms this positive correlation between corruption and the size of the shadow economy. Johnson et al. (1997) find that in 15 post-communism economies the unofficial economy's share of GDP is determined by the extent of control rights held by politician and bureaucrats. This is confirmed in Johnson et al. (1998) for a set of 39 Latin American countries and transition countries.

Friedman et al. (2000) bring this question to a larger data set of 69 countries and find that more bureaucracy, greater corruption, and a weaker legal environment are associated with a larger shadow economy. The authors account for a potential reverse causality problem (a high level of the shadow economy may also undermine political and social institutions) by using instrumental variable estimations. Moreover, their results equally suggest that poor institutions are associated with lower tax revenues as a percentage of GDP. Similar findings are provided by Johnson et al. (2000). Dreher and Schneider (2006) extend this literature by explicitly accounting for a heterogeneous relationship between corruption and the shadow economy in high-income and low-income countries. Moreover, they explicitly model the effect of the reverse relationship from the shadow economy on the level of corruption. They find that corruption and the shadow economy are complements in low tax countries, i.e. increases in the shadow economy undermine political and social institutions and enhance corruption. In contrast, for high-income countries, the authors find that a higher shadow economy goes along with reduced corruption. The latter findings are rationalized with the help of an argument by Choi and Thum (2005), which points out that the option of entrepreneurs to escape to the shadow economy constrains the ability of corrupt officials to ask for bribes.

Moreover, several authors argue that a high tax burden is a second important determinant of the shadow economy. Consequently, increases in the effective tax rate enhance a firm's incentive to operate in the underground economy. Empirical evidence on this correlation is however mixed. While e.g. Johnson et al. (1998) and different papers by Schneider (e.g. Schneider, 2007) provide findings in line with such a positive impact of the tax burden on the size of the informal economy, Friedman et al. (2000) are not able to establish a significant and negative effect of taxes on the size of the shadow economy.

All papers cited in this section base their analysis on shadow economy estimates which follow macro methods like the MIMIC or the electricity input approach. As discussed in Section 2.2.3, these shadow economy estimates are likely to neglect tax evasion and avoidance activities through international channels. Faced with adverse environments, firms that are mobile in an international context may however choose to locate in a different country. A small empirical literature has investigated the link between a higher perceived corruption and investment levels in an international context, mainly finding that higher corruption levels are associated with lower inward foreign direct investments although the evidence is not fully conclusive (see Wei, 2000; Smarzynska and Wei, 2000). Moreover, a set of studies which looks at tax effects on investment and profit levels in the developing world suggests that multinational firms' investments and profits are indeed sensitive to changes in the tax burden (see e.g. Mutti and Grubert, 2004).

Apart from that, several papers claim an impact of tax morale in an economy on the size of the shadow economy. Tax morale is a taxpayer's intrinsic willingness to pay taxes. Some authors argue that tax morale may explain the puzzle that compliance rates in several countries around the world seem to be higher than compliance rates predicted in models with rational agents (see Torgler and Schneider, 2009).[34] Kanniainen et al. (2004) provide evidence from 21 developed OECD countries suggesting a negative impact of tax morale on the size of the shadow economy. This result is confirmed by Torgler and Schneider (2009) who equally find a negative impact of tax morale on the size of the shadow economy. The tax morale variable can explain up to one third of the variation in the shadow economy variable. Torgler and Schneider (2009) also control for potential reverse causality problems and instrument for the tax morale variable using long-lagged information on the social transfer system and geographical conditions.

Related to the issue of tax morale, a literature has evolved that stresses the importance of political governance for tax payer compliance. Tax morale and the level of

[34] It is not clear whether such a puzzle really exists. Studies claiming that there is this puzzle usually assume that detection probabilities are equal to audit rates. But given that tax authorities collect a lot of information about income received by taxpayers, the probability of being audited is not independent of whether or not a taxpayer declares all income received.

voluntary tax compliance is modelled to depend on the extent to which tax payers perceive the state to be legitimate and the extent to which they consider revenues to be well spent, e.g. on improving public goods provision (see Everest-Phillips, 2008a; Lieberman, 2003; Brautigam et al., 2008). Consequently, the design of a sound taxation system is perceived as state-building in the sense that it strengthens the state's legitimacy and enhances economic growth and tax compliance and reduces the size of the shadow economy in a virtuous circle. Everest-Phillips (2008) points out five characteristics of a state-building tax system: political inclusion (i.e. paying taxes gives an incentive to engage with the government and the political process and thus strengthens democracy), accountability and transparency (i.e. the usage of tax revenues is justified to tax payers), perceived fairness (i.e. tax payers perceive the tax system as just which is e.g. the case if tax exemptions for special interest groups and the unofficial economy are reduced to a minimum), effectiveness (i.e. administrative capability that translates public revenues efficiently into public goods) and the political commitment to shared prosperity (i.e. the tax system must be linked to the national strategy of promoting economic growth and wealth).[35]

Furthermore, the size of a country's tax gap will, of course, also depend on the scope and efficiency of the national tax administration. In general, studies for developed economies have shown a positive relation between tax auditing effort and taxpayer compliance (see e.g. Slemrod et al. 2001). Applied to developing countries this suggests that an increased assignment of resources to the national tax administration might help to reduce the national tax gap. Nevertheless, several observers claim this belief to be "particularly naïve" with respect to developing countries (Bahl and Bird, 2008). This scepticism is mainly motivated by past inabilities of tax authorities in the developing world to administer direct taxes in their countries. Here, the tax gap studies sketched above may be a valuable contribution to evaluate the efficiency of a tax authority and to identify areas with low compliance rates which are nevertheless easy to administer and therefore provide efficient opportunities to reduce the national tax gap.

[35] Note that Besley and Persson (forthcoming) investigate the conditions which make the set up of functioning taxation and legal systems in (developing) countries most likely. Among others, their results show that the common interest public goods, like e.g. fighting an external war, as well as political stability and inclusive political institutions are conductive in building fiscal and legal capacity.

Last, the tax gap in a country may also be diminished by economic growth. This is e.g. suggested by Table 1 which depicts a negative correlation between the size of the shadow economy and economic development. For a given tax system economic growth results in higher tax revenues which then pay for a more capable public administration and better public goods and thus may give rise to a virtuous circle of development and state building (see e.g. Everest-Phillips, 2008). Consequently, determinants of economic growth may also exert an indirect impact on the size of the national tax gap. There is a wide range of socio-economic and institutional determinants of economic growth that have been identified in the literature, including e.g. population growth and the average nutrition of the population. In the following, we will restrict ourselves to a short outline of potential institutional determinants of economic growth.

Several papers in the literature suggest that good institutions like the credible protection of property rights are essential for investment and innovation and therefore an important necessary condition for economic growth. It has also been argued that the quality of these institutions largely depends on geographical conditions. If European colonizers e.g. were subject to local diseases and suffered high mortality in a colony, they were likely to establish extractive economies and institutions; if they had good prospects of long lives as producers, they were likely to settle, and establish economic activities and supporting institutions conducive to long-run economic success (see Acemoglu et al., 2001; see also the critique by Albouy 2004, and reply by Acemoglu et al. 2005.)

Finally, there has been a lively discussion about the impact of democracy and democratic institutions on economic growth. A set of papers emphasizes that democracy has positive growth and development effects by facilitating voice and participation (see Dixit, 2005). Rodrik (2000) stresses the importance of local knowledge in the process of successful institution-building, and argues that participatory democracy is a metainstitution that facilitates such use of local knowledge and thereby enhances growth opportunities. Exploiting US data, Besley et al. (2005) argue that political competition is a key to better economic policies and outcomes. Besley and Burgess (2002) find with Indian data that an informed and

active electorate leads to effective incentives for governments to respond to economic problems, and that mass media play an important part in this process.[36]

Summing up, one may conclude that a wide range of social, legal and administrative institutions has been found to have an impact on the national tax gap. Thus, improving revenue mobilisation in developing countries requires a good design and set up of these institutions.

4. Tax Expenditures

While tax revenue mobilisation can be weak due to tax evasion or tax avoidance, it may also be negatively affected by policy measures like the introduction of tax expenditures, which deliberately reduce the tax burden on certain economic activities or taxpayers. Tax expenditures are usually defined as deviations from a benchmark tax system which give rise to tax revenue losses. How exactly such a benchmark tax system is defined is a controversial question and a major challenge for estimates of tax revenue losses due to the use of tax expenditures. Usually, some type of broad based income tax system is used as a benchmark. Tax expenditures occur in many forms. These include tax credits, exemptions, exclusions, deferrals, allowances, reduced tax rates and many more. They may be bound to certain geographic locations (tax free zones) or time spans (e.g. tax holidays).[37]

One way of looking at tax expenditures is to see them as public expenditures. Just as 'normal' public expenditures, tax expenditures may or may not be justifiable by economic policy objectives like income redistribution or the correction of market failures. However, tax expenditures differ from direct government expenditures in a number of ways. In particular, they are frequently less visible and less clearly integrated into the budgetary process. For these reasons, there is widespread concern that tax expenditures are more difficult to control, more vulnerable to capture by lobby groups or even corruption and therefore more likely to lead to budget

[36] Although this suggests a positive impact of democratic institutions on economic growth, it is nevertheless important to point out that other authors simultaneously made a serious case for authoritarian governments and institutions when it comes to starting growth and development. For example, Glaeser et al. (2004) argue that less-developed countries which achieve economic success do so by pursuing good policies, often under dictatorships, and democratize at a later stage in the development process (see also Dixit, 2005).

[37] See Swift (2006), p. 3.

imbalances and governance problems than direct government expenditures. Since issues of fiscal transparency and political accountability are particularly pressing in developing countries, tax expenditures may be particularly problematic in these countries. Moreover, since tax expenditures lead to more complicated tax systems, there is a concern that tax expenditures might encourage tax avoidance and tax evasion.

Of course, all this does not imply that tax expenditures are necessarily undesirable as policy instruments. Depending on the policy objective pursued and the institutional environment, tax expenditures may also have advantages. For instance, if a malfunctioning of the tax administration deters foreign direct investment, simply exempting investors from paying domestic corporate income taxes for some time (tax holidays) may be more effective as a way of encouraging investment than expenditure policies.

4.1. Reporting on General Tax Expenditures

Different countries use different concepts to identify tax expenditures. But one common feature shared by many countries is that measures of tax expenditures are based on some concept of a benchmark tax system. On this basis, revenue losses due to tax expenditures can be calculated. Swift (2006) identifies three groups of countries according to their general approaches to measuring and reporting tax expenditures. The first group of countries have identified benchmark tax systems and tax expenditures, and they have calculated or estimated the revenue losses caused by these expenditures. This group mostly includes OECD member states and no developing countries. In the second group of countries, some countries have defined benchmark tax systems and others have not done so, but they have all produced partial estimates of tax expenditures. Most countries in this group are transition countries or developing countries.[38] Finally, there is a third group consisting of countries which have neither identified benchmark tax systems nor produced any estimates of tax expenditures.

[38] Swift reports that Argentina, Bangladesh, Brazil, Bulgaria, China, Latvia, Hungary, India and Poland belong to this group.

The estimated and reported levels of tax expenditures differ widely across countries and reporting methods. Methods for calculating these losses include approaches which may or may not take into account behavioural adjustments to tax expenditures; other approaches estimate the expenditure which would be required to achieve the objectives of the tax expenditure.[39] Given this, comparing the results of reports which use different methods may be highly misleading.

Reported tax expenditures in developing countries differ widely. For instance, reported tax expenditures in the Netherlands (2002) were 2% of GDP whereas tax expenditures reported in Australia (2003) were 4% of GDP and in Canada and the U.S. (2003) approximately 7% of GDP.[40] These numbers are the results of calculations using different methods, so that they are not comparable across countries.

For developing countries, much less information is available than for developed countries, for the reasons mentioned above. Existing estimates include numbers reported by Mortaza and Begum (2006) for Bangladesh (2.52% of GDP in 2005), India (4.49% of GDP in 2005), Pakistan (0.381% of GDP in 2005), as well as estimates reported by Swift (2006), for Turkey (5% of GDP in 2003), and China ("well over 10% of GDP in 2002"). In the context of Article IV consultations, the IMF reports tax expenditure levels of 6% in 2006 for Barbados[41], 1.7 % of GDP in 2002 for Tunisia[42] and 0.5% of GDP for the Philippines in 2007[43]. Again, it should be emphasized that these numbers are not comparable across countries because they are based on different measurement concepts and methods.

The IMF (2003) offers some additional, qualitative survey information on fiscal transparency which includes reporting on tax expenditures. This report confirms that most developing countries publish no data on the volume of tax expenditures.[44]

4.2. Tax Incentives for Corporate Investment

[39] See e.g. Kaan (2004), p.136-137.
[40] Swift (2006), p. 8.
[41] IMF (2007), p.11,
[42] IMF (2002), No. 29.
[43] IMF (2009), p.24.
[44] See IMF (2003), Annex II.

Among the various types of tax expenditures existing in developing countries, tax incentives for corporate investment, in particular foreign direct investment, have received most attention. Many developing countries use special tax incentives like tax holidays, investment allowances, free enterprise zones or tax sparing provisions. Again, little statistical information on the level of existing investment incentives and their development over time is available. But a dataset recently collected by Keen and Mansour (2008), which covers 40 Sub-Saharan African countries does suggest that the use of tax incentives for investment has increased over the last decades. For instance, in 1980, only one among the 29 countries for whom data is available for this year offered free zones, i.e. zones where special corporate income tax treatment is offered. In 2005, almost half of the countries covered by the dataset offered this type of incentives. Table 2 gives an overview over the different types of tax incentives reported by Keen and Mansour (2008) and their change over time.

- Table 2 here -

In addition to the increase of investment tax incentives in general, there is a change in the types of incentives used. The use of tax holidays, reduced corporate income tax rates, free zones and investment codes has increased dramatically whereas the share of countries using investment allowances is more or less unchanged.

In the literature, the growing use of tax incentives for investment in developing countries is criticised for various reasons (see e.g. Bird (2008), Klemm (2009)). One issue is that these tax incentives reduce corporate income tax revenue. Whether this is true is not entirely clear, though. As pointed out by Keen (2001), allowing countries to differentiate in the taxation of bases with different degrees of mobility may reduce the intensity of tax competition and increase tax revenue. Along these lines, Keen and Mansour (2008) argue that there is a case for taxing immobile resource activities at higher rates than other, mobile activities. However, apart from the resource case, they question the relevance of the argument and point to the disadvantages of special tax

incentives, which include the administration and compliance costs of delineating the mobile part of the tax base from the less mobile part.[45]

In addition to this particular point, there is a broader debate about the question of whether or not the use of tax incentives for investment in developing countries is desirable. One issue is that the cost of tax incentives may be greater than expected because of tax avoidance schemes set up to exploit them. Moreover, it is difficult to distinguish genuine FDI from domestic-source investment because 'round tripping' may occur, where domestic capital is routed offshore and then brought back as foreign investment. Klemm (2009) summarizes the empirical and theoretical research in this area and concludes that the usefulness of tax expenditures depends on their design and the particular circumstances under which they are introduced.

Overall, the available statistical information provides little basis for assessing the impact of tax expenditures on revenue mobilisation. This is not only because the available quantitative information on tax expenditures in developing countries is scarce, incomplete and not comparable across countries. A second reason is that it is not clear which tax expenditures could be abolished without being replaced by direct government expenditures. Most parts of the poorer population in developing countries do not pay taxes and therefore cannot benefit directly from tax expenditures. Thus, as far as tax expenditures pursue the objective of redistributing income, they may not be a substitute for direct expenditures. But they may be related to other purposes like e.g. promoting investment and job creation. Especially the latter may support revenue mobilisation by generating more labour tax revenue. Therefore, not only quantitative but also much more detailed qualitative information on tax expenditures would be required to identify potentials for revenue mobilisation in this area.

[45] The economic rationale for tax incentives for foreign direct investment, albeit with reference to developed countries, is discussed extensively in OECD (2001).

5. Conclusions and Directions for Future Research

The main objective of this paper was to review quantitative studies which try to estimate tax revenue losses due to tax avoidance and tax evasion in developing countries. Existing studies distinguish between estimates of the domestic component of tax evasion and tax avoidance and the international component. The domestic component would include tax evasion which occurs due to the domestic shadow economy. The international component includes tax revenue losses due to profit shifting by corporations and offshore holdings of financial assets by private individuals. Table 3 in the appendix summarizes the studies surveyed in this paper.

The starting point of our survey is a study by Cobham (2005), which quantifies the domestic component of the tax gap due to tax evasion in the developing world to be equal to US-$ 285 billion. We analyse Cobham's estimation approach with respect to conceptual and methodological issues to determine the reliability of this number. Cobham's calculation of tax evasion is based on estimates of the size of the domestic shadow economy by Schneider (2005, 2007).

As we discuss in the paper, this approach has a number of limitations. Most importantly, the number derived by Cobham (2005) should not be interpreted as an increase in tax revenue which could possibly be achieved by better tax enforcement or other policy measures. But this is not only due to the fact that it is practically impossible to tax all economic activity in the shadow economy, as Cobham himself points out. For various reasons, the measured size of the shadow economy may be a misleading indicator of the tax gap. Firstly, as argued by Auriol and Walters (2005), the size of the shadow economy may be the result of policy choices made by developing countries, which would imply that crowding back the shadow economy may neither increase tax revenue nor be in the interest of national welfare. This is a provocative result, but taking into account that the size of the shadow economy is influenced by policies is important. Secondly, shadow economy activities as quantified in the Schneider estimates include illegal activities which would be stopped if detected and thus would not generate tax revenue. Thirdly, measures of the shadow economy as those provided by Schneider have to be interpreted with caution. Due to the estimation method used, the change of these measures over time is likely to be

more informative than the levels of these estimates. But estimates of tax evasion are based on estimates of the levels. All this suggests that the Cobham-estimates of tax evasion have to be interpreted with caution.

From a methodological perspective, the quantification of domestic tax avoidance and evasion in Cobham (2005) relies on shadow economy estimates based on macro indicators. We compare this approach to other methods to quantify the (domestic) tax gap in an economy. These approaches can be broadly divided into macro approaches (which employ data on a country's national accounts and macroeconomic indicators to quantify the tax gap) and micro approaches (which employ individual data retrieved from surveys and audits to quantify the tax gap). In general, our paper argues that micro approaches, which exploit information from tax audits of randomly selected tax payers, are most likely to deliver reliable tax gap estimates. In contrast, methods to quantify the domestic tax gap on the basis of macro indicators as e.g. undertaken in Schneider (2005) / Cobham (2005) are less reliable and informative. Unfortunately, most existing studies for the developing world rely on this type of macro approach. Detailed and comprehensive tax gap analyses using micro data are only available for industrialized countries.

A possible starting point to improve the information on tax gaps in the developing world would be to improve existing tax gap approaches by using macro methods based on the identification of discrepancies in national accounting data. This would follow approaches used by some tax authorities in the industrialized world (see e.g. Swedish National Tax Agency, 2008). Despite some restrictions, the IMF data base on Government Financial Statistics and the World Bank's World Development Indicator data does offer information which could be used for this purpose. Whether the available data is complete and of sufficient quality would have to be investigated in greater detail.

Moreover, like all macro methods, approaches which determine (a part of) a country's tax gap based on national accounting information have the disadvantage that they produce aggregate information on the tax gap only. To determine why taxes are evaded and to find appropriate policy measures to improve tax administration and

compliance, a disaggregated analysis by taxes and tax payer groups would be required.

We therefore think that, in the long run, an appropriate quantification of the tax gap in the developing countries requires research based on micro approaches, in particular methods which rely on tax audit information collected by the national tax authorities. Despite the cost-intensity of audit based tax gap studies, we would consider it worthwhile to undertake such an analysis. First, this approach would deliver a reliable estimate for the national tax gap. Second, it would allow to calculate individual components of the tax gap according to tax payer groups (e.g. corporations versus individuals, different income classes and sectors of activities) and the type of income which is evaded (e.g. income earned from international and national transactions). The latter provides important and valuable guidance for reforms of the tax administration and the tax system in a developing country. Moreover, the costs to implement a tax audit study may be reduced if tax authorities in the developing world could draw upon the experience of tax officials and researchers in industrialized economies who previously undertook tax gap analyses.

Besides that, a potentially fruitful approach might be to investigate whether the shadow economy contributes to the (domestic) tax gap at all. Starting from the findings of Auriol and Walters (2005), this would imply to investigate whether the shadow economy (and other factors) determine tax revenue mobilisation as measured, for instance, by the tax to GDP ratio, thereby taking into account issues like the endogeneity of the size of the shadow economy and other explanatory variables.

In a second step, our paper discusses studies which try to quantify the international component of the tax gap. Two groups of studies can be distinguished. The first group focuses on the shifting of corporate profits out of developing countries. The most influential studies in this area try to identify profit shifting by analysing international trade prices. The basic idea is that prices charged for goods exported to developing countries are distorted upwards whereas prices of goods imported from developing countries are set to artificially low levels, so that income effectively generated in developing countries is shifted to developed countries. According to these studies, trade price distortions may arise with trade between both unrelated parties (where

exporter and importer collude) and related parties (within multinational firms). To quantify the tax revenue developing countries lose due to these price distortions, the authors often rely on anecdotal evidence or non representative survey data. More sophisticated work in this area based on micro data for trade transactions finds some evidence on systematic price distortions. These are interpreted as reflecting shifting of income from developing countries to industrialised countries like the US and the United Kingdom.

The main methodological weakness of the mispricing approach is that it is unclear to which extent price differences simply reflect *quality differences* within a product group. If there are price differences within product groups, it is natural to assume that developing countries tend to export low-end/low-price products whereas developed countries export high-end products with higher prices (Schott (2008)). The price patterns observed in the data may therefore just reflect differences in the quality structure of goods produced by countries in different stages of economic development. From this perspective, interpreting the data as revealing income shifting is misleading. If the observed price differences are at least partly due to quality patterns where developed countries tend to produce higher quality goods, the existing studies systematically overestimate corporate income shifting.

Moreover, a key shortcoming of many existing studies based on mispricing is that they only take into account overpriced imports into developing countries and underpriced exports of these countries. But the mispricing approach would also allow to identify underpriced imports into developing countries and overpriced exports. Both shift income into developing countries. Estimates of tax revenue calculations have to take into account income shifting in *both directions*. If only one direction is taken into account, the results are misleading. In this case, tax revenue losses due to mispricing are overestimated drastically.

Another issue is the way in which existing studies of profit shifting translate their estimates of income shifting into tax revenue losses. Simply multiplying results for income shifted out of developing countries with statutory corporate tax rates neglects the existence of investment incentives like e.g. tax holidays, free enterprise zones and many others. As we have shown in section 5, investment tax incentives are widely

used in developing countries. For this reason, less income shifting would not necessarily increase corporate tax revenue in developing countries; part of this income would simply be tax exempt or taxable at very low rates.[46]

The existence of investment tax incentives and the fact that the standard corporate tax rates in developing countries are often lower than those of developed countries, also question the view that income shifting going from developing directly to developed countries is primarily motivated by taxation. If it is true that observed trade price patterns at least partly reflect income shifting from developing countries to countries like the US or the UK, this type of income shifting could be driven by forces other than taxation because firms would increase the taxes they pay. Tax motivated income shifting out of developing countries is more likely to be routed through tax havens.

In order to better understand the issue of price distortions and corporate income shifting, it is necessary to investigate in greater detail whether prices observed reflect quality differences or income shifting. Clearly, income shifting in *both directions* has to be taken into account. To the extent that income shifting does take place, either through mispricing or other instruments like e.g. debt financing, it is important to investigate *why* income is shifted out of developing countries. In order to achieve this, we would recommend using micro data for firms in developing countries which has become available in recent years (e.g. the ORBIS data base provided by Bureau van Dijk or the AFDI data provided by the ONS). This data allows for a detailed look at the question of income shifting activities out of developing countries on the basis of firm information. Work along these lines would provide evidence for the existence (or the non-existence) of profit shifting out of developing countries, and it would also allow to investigate whether tax differences or other factors are the driving force behind profit shifting.

A second group of 'international' studies focuses on tax evasion by wealthy individuals residing in developing countries who hold financial assets abroad and do not report this income in their country of fiscal residence. The tax gap calculations in this area strongly rely on the quantification of offshore wealth holdings by individuals

[46] This also implies that studies based on FDI stocks and assumed rates of return overestimate the tax revenue losses due to income shifting.

residing in developing countries. The existing studies mostly start with rough estimates of worldwide financial assets held offshore and then make some ad hoc assumptions on taxable returns, tax rates, and the share of overall assets owned by individuals residing in developing countries. Again, it is difficult to interpret the results of these calculations. Moreover, in order to provide policy recommendations, it would be helpful to clearly identify the key determinants of offshore wealth holdings.

Last, we think that the special role of tax havens deserves more attention. Several papers in the literature (e.g. Oxfam, 2000) suggest that tax havens cause part of the tax gap in the developing world. However, neither of these claims is based on rigorous empirical analysis. From our point of view, it is possible to gain additional insights at least for the corporate sector, e.g. on the basis of firm data as provided by Bureau van Dijk and the ONS. Precisely, we would suggest to build on related work for the industrialized world by Desai et al. (2006a, 2006b) and Maffini (2009) who investigate how the presence of a multinational firms in a (regionally close) tax haven country affects the tax payments in the considered non-haven country. This type of research allows to investigate e.g. whether or not tax haven presence allows firms to reduce their worldwide tax payments and whether some tax havens (for instance geographically close tax havens) have a larger impact than others.

As an overall assessment of the literature on tax gap estimates for the developing world, we conclude that the available knowledge on tax revenue losses in developing countries caused by tax evasion and tax avoidance is limited. This is partly due to the lack of data and partly due to methodological shortcomings of existing studies. Some of the existing estimates of tax revenue losses due to tax avoidance and evasion by firms systematically overestimate the losses. Other studies are based on assumptions which are so strong that the results are difficult to interpret. Overall, it is fair to conclude that most existing estimates of tax revenue losses in developing countries due to evasion and avoidance are not based on reliable methods and data.

Moreover, it seems that too much emphasis is put on producing aggregate estimates of tax revenue losses for the developing world as a whole. While aggregate numbers on the volume of tax avoidance and evasion in developing countries do seem to attract public attention, it should be kept in mind that developing countries are very

heterogeneous. Research on tax avoidance and evasion as well as policies to achieve more revenue mobilisation should take this heterogeneity into account. More research along the lines described above is needed to improve our understanding of tax avoidance and evasion and the implications of these activities for revenue mobilization in developing countries. Suggestions for future research are summarized in table 4.

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Table 1: La Porta and Shleifer (2008): Indicators for the Size of the Shadow Economy

	Measure of Informality			
	GDP/Population	% of GDP MIMIC: Schneider (2007)	% of GDP Electricity Consumption	% of GDP World Economic Forum
First GDP p.C. Quartile	429	42.3	38.9	35.4
Second GDP p.C. Quartile	1,362	39.8	42.7	33.7
Third GDP p.C. Quartile	4,002	34.1	31.3	27.6
Fourth p.C. Quartile	20,348	18.3	17.6	17.3
Sample Mean	10,015	34.5	29.0	27.6
No of Observation	185	145	57	125

Table 1: La Porta and Shleifer (2008): continued

	Measure of Informality		
	% Tax Evasion Entreprise Survey	Registered Firms/ Population(000s)	% Self-Employment Non-Agriculture
First GDP p.C. Quartile	29.0	3.2	57.3
Second p.C. Quartile	23.3	8.2	37.1
Third p.C. Quartile	19.7	28.7	24.6
Fourth p.C. Quartile	8.2	41.8	12.5
Sample Mean	22.5	24.7	30.8
No of Observation	95	83	96

Table 2: Investment Tax Incentives in Sub Saharan African Countries 1980 and 2005

	1980			2005		
	Number of countries offering incentives	Total number of countries(2)	Ratio (1)/(2)	Number of countries offering incentives	Total number of countries(2)	Ratio (1)/(2)
Tax Holidays	13	29	0.45	27	39	0.69
Reduced CIT Rates	3	29	0.1	20	39	0.51
Investment Allowances	17	29	0.59	22	39	0.56
Incentives for Exports	3	29	0.1	11	39	0.28
Free Zones	1	29	0.03	18	39	0.46
Investment Code	9	29	3.1	29	39	0.74

Source: Keen and Mansour (2008), Table 2.

Table 3: Studies on Tax Revenue Losses due to Tax Avoidance and Evasion in Developing Countries

1. Domestic Component

Author & Year	Objective	Results Related to Tax Avoidance / Evasion	Data
Cobham (2005)	Estimate overall tax revenue losses due to tax evasion in developing countries	Tax revenue loss due to domestic shadow economy activities 285 billion US-Dollars per year	WDI, Schneider (2005)
Bird et al (2004)	Investigate determinants of revenue mobilisation in developing countries	Revenue mobilisation is negatively correlated with the size of the shadow economy, no estimate of tax revenue losses	Various data sources, shadow economy data by Schneider and Klinglmair (2003)
Auriol and Warlters (2005)	Investigate determinants of revenue mobilisation in developing countries	Revenue mobilisation is not systematically related to size of the shadow economy, no estimate of tax revenue losses	Various data sources, shadow economy data generated by averaging of different studies

2a) International Component - Profit shifting by corporations

Author & Year	Objective	Results Related to Tax Avoidance / Evasion	Data
Baker (2005)	Estimate illicit financial flows leaving developing countries, analyse various components of these flows	350 billion US-Dollars of income are shifted out of developing countries per year through trade mispricing and fake transactions	Interviews, data not publicly accessible
Cobham (2005)	Estimate overall tax revenue losses due to tax evasion developing countries	Tax revenue losses due to corporate profit shifting out of developing countries 50 billion US-Dollars per year	Estimate (including revenue losses from offshore holdings of financial assets) taken from Oxfam (2000)
Christian Aid (2008)	Estimate tax revenue losses due to profit shifting out of developed countries through trade mispricing	Developing countries lose 160 billion US-Dollars of tax revenue in 2008 due to profit shifting via mispricing	WDI Data, assumed average underpricing of exports and overpricing of imports of developed countries of 7%
Christian Aid (2009)	Estimate tax revenue losses in developing countries due to profit shifting through trade mispricing	Profit shifting from non-EU countries to the EU and the US cause tax revenue losses to developing countries of 121.8 billion US-Dollars per year on average 2005-2007	Estimates by Simon Pak based on EU and US Trade Data, approach similar to Pak (2007)

Global Financial Integrity (2009)	Estimate profit shifting out of developing countries through trade mispricing	371 billion US-Dollars of income are shifted out of developing countries through trade mispricing on average 2002-2006	Estimates on mispricing based on EU and US trade data, approach similar to Pak (2007)
Oxfam (2000)	Estimate tax revenue losses caused by corporate profit shifting	Tax Revenue losses due to corporate profit shifting: 35 billion US-Dollars per year in 1998	Unctad Data and World Bank data on FDI Stocks and rates of return
Pak (2007)	Estimate profit shifting into the US through trade over- and underpricing	202 billion US-Dollars of income are shifted out of developing countries into the US through trade mispricing in 2005	US Trade Data
2b) International Component - Offshore holdings of financial assets of private individuals			
Author & Year	**Objective**	**Results Related to Tax Avoidance / Evasion**	**Data**
Oxfam (2000)	Estimate tax revenue losses due to holdings of financial assets abroad	Revenue losses due to offshore holdings of financial assets 15 billion US-Dollars per year	Based on estimate of offshore wealth holdings from 1990s, source unclear
Oxfam (2009)	Estimate tax revenue losses due to holdings of financial assets abroad	Revenue losses due to offshore holdings of financial assets 64-124 billion US-Dollars per year	Refers to estimates of offshore asset holdings of residents of developing countries of 6.2 trillion US-Dollars, source not clear
Tax Justice Network (2005)	Estimate worldwide tax revenue losses due to offshore holdings of financial assets	Revenue losses due to offshore holdings of financial assets 255 billion US-Dollars per year for all countries	Selected estimates from wealth reports published by banks and consulting companies
Cobham (2005)	Estimate overall tax revenue losses due to tax evasion in developing countries	Revenue losses due to offshore holdings of financial assets 255 billion US-Dollars per year for all countries	Based on Tax Justice Network (2005), multiplies results with share of developing countries in GDP

Table 4: Possible Directions for Research on Tax Evasion and Tax Avoidance in Developing Countries
1. Assessing Corporate Income Shifting Based on Firm Level Data To investigate corporate profit shifting out of developing countries, we recommend using micro data for firms in developing countries which has become available in recent years (e.g. the ORBIS data base provided by Bureau van Dijk or the AFDI data provided by the ONS). Work along these lines would provide evidence for the existence (or the non-existence) of profit shifting out of developing countries, and it would allow to investigate whether tax differences or other factors are the driving force behind profit shifting activities.
2. Assessing the Role of Tax Havens Based on Firm Level Data The role of tax havens deserves more attention. From our point of view, it is possible to gain additional insights at least for the corporate sector, e.g. on the basis of firm data as provided by Bureau van Dijk and the ONS. We suggest to build on related work for the industrialized world by Desai et al. (2006a, 2006b) and Maffini (2009) who investigate how the presence of a multinational firms in a (regionally close) tax haven country affects the tax payments in the considered non-haven country. This type of research allows to investigate e.g. whether or not tax haven presence allows firms to reduce their worldwide tax payments and whether some tax havens (for instance geographically close tax havens) have a larger impact than others.
3. Estimating the Tax Gap Based on National Accounting Data Existing tax gap estimates could be improved by using macro methods based on the identification of discrepancies in national accounting data. This would follow approaches used by some tax authorities in the industrialized world (see e.g. Swedish National Tax Agency, 2008). Despite some restrictions, the IMF data base on Government Financial Statistics and the World Development Indicator does offer information which could be used for this purpose. Whether the available data is complete and of sufficient quality would have to be investigated in greater detail.
4. Estimating the Tax Gap Based on Tax Audit Data In the long run, an appropriate quantification of the tax gap in the developing countries requires research based on micro approaches, in particular methods which rely on tax audit information collected by the national tax authorities. Despite the cost-intensity of audit based tax gap studies, we consider it worthwhile to undertake such an analysis. First, this approach would deliver a reliable estimate for the national tax gap. Second, it would allow to calculate individual components of the tax gap according to tax payer groups and the type of income which is evaded. The latter provides important and valuable guidance for reforms of the tax administration and the tax system in a developing country. Moreover, the costs to implement a tax audit study may be reduced if tax authorities in the developing world could draw upon the experience of tax officials and researchers in industrialized economies who previously undertook tax gap analyses.