Base Erosion and Profit Shifting (BEPS)

Public Discussion Draft

BEPS ACTION 11: IMPROVING THE ANALYSIS OF BEPS

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OECD
BETTER POLICIES FOR BETTER LIVES

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Boxes

INTRODUCTION

In September 2013, OECD and G20 countries, working together on an equal footing, adopted a 15-point Action Plan to address base erosion and profit shifting (BEPS).

The Action Plan states that improving the availability and analysis of data on BEPS is critical, including monitoring the implementation of the Action Plan. In relation to the scope of Action 11, the Action Plan provides for the following:

> *Establish methodologies to collect and analyse data on BEPS and the actions to address it. Specifically to: Develop recommendations regarding indicators of the scale and economic impact of BEPS and ensure that tools are available to monitor and evaluate the effectiveness and economic impact of the actions taken to address BEPS on an ongoing basis. This will involve developing an economic analysis of the scale and impact of BEPS (including spillover effects across countries) and actions to address it. The work will also involve assessing a range of existing data sources, identifying new types of data that should be collected, and developing methodologies based on both aggregate (e.g. FDI and balance of payments data) and micro-level data (e.g. from financial statements and tax returns), taking into consideration the need to respect taxpayer confidentiality and the administrative costs for tax administrations and businesses*.

Working Party No. 2 of the Committee on Fiscal Affairs (CFA) has examined a number of empirical economic analyses on BEPS and BEPS countermeasures and the data currently used in those analyses. This discussion draft presents an initial assessment of the currently available data, as well as a number of questions about the data needed for analysis of BEPS and BEPS countermeasures. The discussion draft also develops some recommendations for indicators of the scale (fiscal effects) and economic impacts of BEPS, and seeks comments on the proposed and other potential indicators. Finally, the discussion draft provides a high-level overview of the available economic analyses of the scale and impact of BEPS and BEPS countermeasures. Two complementary approaches to estimating the scale of BEPS are proposed, and a number of questions about economic analyses are raised.

The discussion draft does not discuss new tools to monitor and evaluate the effectiveness and economic impact of the actions taken to address BEPS on an ongoing basis, or new types of data that might be useful in helping to analyse BEPS into the future. Working Party No.2 is seeking stakeholder and public input through this consultation before making recommendations in those two areas, although comments and input on these two issues would also be welcome.

In particular, this discussion draft includes consideration of the following issues:

- What is the currently available data to analyse BEPS and BEPS countermeasures?
- What are best practices in governments collecting and making available for research available data?
- Whether there are additional indicators of BEPS that might be provided.
- Whether the proposed indicators could have their "signal-to-noise" ratio enhanced.
- Whether there are additional empirical analyses of BEPS and BEPS countermeasures, particularly in developing countries.
- Whether there are alternative approaches or refinements of the two proposed approaches to estimating the scale of BEPS.

The options included in this discussion draft do not represent conclusions on the assessments or proposed measures, but are intended to provide stakeholders with substantive options for analysis and comment.

Chapter 1

ASSESSMENT OF EXISTING DATA SOURCES RELEVANT FOR BEPS ANALYSIS

Key points:

- This chapter assesses a range of existing data sources with specific reference to the availability and usefulness of existing data for the purposes of developing indicators and undertaking an economic analysis of the scale and impact of BEPS and BEPS countermeasures.
- This chapter concludes that the significant limitations of existing data sources mean that, at present, attempts to construct indicators or undertake an economic analysis of the scale and impact of BEPS are severely constrained and, as such, should be heavily qualified.
- While there are several different private data sources and aggregated official sources currently available to researchers, they are all affected by various limitations that affect their usefulness for the purposes of analysing the scale and impact of BEPS and BEPS countermeasures.
- One of the key challenges with currently available data sources is that it is difficult for researchers to disentangle real economic effects from the effects of BEPS-related behaviours.
- Private firm-level financial account databases are more useful, but are not comprehensive in their coverage, have significant limitations in their representativeness in some countries, do not include all MNE entities and/or all of their associated financial information, and do not have information about taxes actually paid.
- Some of the limitations of the currently available data also affect the ability of individual governments to analyse how BEPS impacts their economies and tax revenues.
- While tax return data covering all subsidiaries of MNES are potentially the most useful form of data, most countries do not have or make such data available for the purposes of economic and statistical analysis, even on an anonymised or confidential basis. Furthermore, there is presently a lack of detail since the majority of governments do not report total revenue collections of MNEs separately from purely domestic companies using tax returns.
- Recent parliamentary and government enquiries have shed new light on the tax affairs of some high profile MNEs. While this information represents a rich and emerging source of evidence of the existence of BEPS, such information relates to the activities of a small number of MNEs and is of limited use in undertaking a broader analysis. In some cases, this information is not included in the available firm-level financial account data, which highlights the inadequacy of relying exclusively upon them.
- More comprehensive and more detailed data regarding MNEs is needed to provide more accurate assessments of the scale and impact of BEPS. Some of the existing data limitations may be overcome by requiring the collection of additional data, ensuring better use of data that is already collected or by identifying “best practices” and developing recommendations that might be adopted by countries in a coordinated manner.

Introduction

1. Assessing currently available data is an important part of BEPS Action 11. Having a proper understanding of the available data and its limitations is a fundamental issue for the development of indicators showing the scale and economic impact of BEPS, as well as for the development of economic analyses of the scale and impact of BEPS and BEPS countermeasures.

2. It cannot be overemphasised that the results obtained from any analysis are only as robust as the data and methodology underpinning them. This is particularly true in the case of analysing BEPS, since BEPS involves multinational enterprises (MNEs) that can establish intra-group arrangements that achieve no or low taxation by shifting profits away from jurisdictions where the activities creating the profits are taking place. These intra-group cross-border arrangements are often very complex involving multiple related entities, and related party transactions are typically not separately identifiable (and available) in tax or financial accounting databases.

3. Hence, it is crucial to establish an understanding of the currently available data – what is available; the coverage and representativeness of that data; whether it is tax return or financial accounting data; whether it is macro or micro level data; its reliability and robustness (what quality control measures are in place for the data collection); whether it is comparable across jurisdictions; and who has access to it.

4. This chapter provides an initial assessment of the data currently available for analysing BEPS and BEPS countermeasures, which is relevant to both the development of potential indicators and the undertaking of refined economic and statistical analyses. It is important to note that most analyses, including government policy analyses and decisions, are made with partial information. For policymakers, using available data to conduct some analysis is better than working without empirical-based evidence at all, but such analyses must also recognise the limitations of currently available data and how those limitations may affect the reported results.

5. The purpose of the assessment undertaken in this chapter is to describe what is available, as well as outline the benefits and limitations of the different types of data. Based on this assessment, Action 11 also involves the identification of new types of tools and data that should be collected in the future. New data could include capitalising on existing data that is currently unavailable, either due to confidentiality reasons or because it is not currently processed or analysed, as well as additional information needed for monitoring BEPS in the future, taking into account ways to reduce administrative costs for tax administrations and businesses.

Potential criteria for evaluating available data for BEPS research

6. An assessment requires establishing a set of criteria to be used for evaluating the different types of data with respect to their usefulness for analysing BEPS. Having a thorough understanding of the available data will provide a solid base for working towards ‘best practices’ in future data collection to 'fill the gaps' and strive for more comprehensive data and comparability across countries.

7. Box 1 briefly outlines a set of criteria that could be considered.

Box 1. Criteria for assessing data

Coverage/Representativeness – BEPS is a global issue and significant profit shifting may occur through "small" entities with large profits but with little economic activity. Determining the coverage and representativeness of the underlying data is critical to assessing the results of any analysis. Most databases are limited to individual countries or a region, and there is no truly comprehensive global database of MNE activity.

Usefulness for separating real economic effects from tax effects – Separating BEPS-related activity from real economic activity is important, but must be estimated. National Accounts and macroeconomic statistics, such as foreign direct investment data, combine both real and BEPS-related activity. Firm-level data provides researchers with more information to attempt to more accurately separate BEPS-related activities from a firm's real economic activities.

Ability to focus on specific BEPS activity – BEPS is driven by practices that artificially segregate taxable income from the real economic activities that generate it. A MNE's financial profile can be very different between financial and tax accounts. Differences in financial and taxable income can be large, and the country of taxation can differ from the firm's country of incorporation. In some cases, specific tax information may be available for a limited number of MNEs from specific parliamentary enquiries.

Level of detail – As BEPS behaviours involve cross-border transactions, typically between related parties, information on related and unrelated party transactions should be used when available. Affiliate-level information should supplement worldwide consolidated group information when available. Different types of foreign direct investment should be used when available.

Timeliness – Access to timely information enables policymakers to monitor and evaluate the changes in the BEPS environment and the effects of legislation. If the time lag is too long, empirical analysis may be more of an historical assessment, rather than an analysis of recent developments.

Access – Many BEPS behaviours cannot be identified as specific entries on tax returns or financial accounts. Analysis of the data is required to separate BEPS behaviours from real economic activity. Thus, policymakers need economic analyses of BEPS and BEPS countermeasures, rather than just compile descriptive statistics. The extent to which access to data is provided to statisticians and economists within government, and potentially outside of government, with strict confidentiality rules, represents an important policy issue.

8. ***Coverage/Representativeness***. BEPS is a global issue so comprehensive coverage across all countries would be ideal. Many macro-level aggregate data are available for most countries. Coverage of the entities that form part of MNEs is an important issue. A number of firm-level databases are available for individual countries, and the few private "global" databases are increasing coverage across multiple countries.

9. But even where data for a particular country exists, coverage issues may continue to complicate a rigorous assessment of BEPS. One aspect concerns the coverage of financial information for the entities included in the firm-level databases. Missing financial information may have an equally detrimental effect on an analysis as if the entity were not included in the database. Aggregation of financial information in respect of entities within MNE groups can also distort and limit the analysis.

10. Another aspect concerns the coverage of firms included in the databases. Incomplete coverage of firms for any number of reasons means that the data collected may be from a non-random sample and so, potentially, a non-representative sample of firms. Extrapolating results beyond a non-random sample has limitations which may be partially addressed by weighting or sensitivity analysis. This is likely to be a significant issue in the analysis of BEPS because of the potential concentration of BEPS in certain types of entities (e.g., located in low- or no-tax countries). This is particularly problematic if those entities

engaging in more BEPS-related behaviours are more likely to avoid or minimise the disclosure of relevant financial information.

11. Tax return information is generally filed only for entities that have a taxable presence in a country. Some countries may require foreign-owned companies that have a physical presence in the country, but not a tax presence, to register with a designated body. Many countries' tax administrations do not have information about the other affiliates of a MNE group, other than those with a permanent establishment in the country. For example, in South Africa, a foreign company that is physically present in South Africa must register as an external company with the Companies and Intellectual Property Commission. External companies do not have to file annual financial reports with the Commission, but the South African Revenue Service could obtain a list of these companies from the Commission. Many countries have entered into bilateral or multilateral Double Taxation Agreements and Exchange of Information Agreements that enable them to exchange information as well as conduct simultaneous or joint audits on a taxpayer.

12. ***Usefulness for separating real economic effects from tax effects***. BEPS is a tax issue with financial and economic ramifications. As noted below, BEPS affects the reported taxes, but also affects many non-tax variables, including macroeconomic aggregates, such as gross domestic product (GDP) or foreign direct investment (FDI), and firm-level/group financial information, such as reported financial profits or tax return information.

13. Estimating the effects of BEPS requires disentangling real economic activity across countries from tax-related (and specifically BEPS-related) behaviours across countries. In fact, there are three different categories of effects that ideally would be separately estimated: (i) real economic activity across countries independent of tax; (ii) real economic activity across countries influenced by differences in non-BEPS-affected tax rates (e.g. responsiveness of capital investment to a change in a country's effective tax rate); and (iii) BEPS-related activities across countries that include financial flows, legal contracts and structuring to shift profits away from where value is generated. In some cases, the structuring involves placing just enough economic activity (staff and functions for example) in a jurisdiction to attempt to justify the tax minimisation strategy. Only category (iii) effects should be attributed to BEPS.

14. Macroeconomic aggregates, such as FDI include both real and BEPS-related investment and returns, which are difficult or impossible to separate. In their current reporting of FDI, most countries have not been able to separate FDI related to real investment (greenfield and expansion investment) from financial transactions (mergers and acquisitions and the accumulation of reinvested earnings). While BEPS behaviours are more likely to be concentrated in the latter, there could be instances where, for example, a small operational facility (greenfield investment) is set up in a foreign jurisdiction with the main purpose of justifying a BEPS arrangement under current national rules. The IMF[1] recently conducted a project on bilateral asymmetries in FDI reporting for the Coordinated Direct Investment Survey (CDIS). The project confirmed that methodological differences and insufficient data coverage are the main reasons for bilateral asymmetries. In 2014, the OECD implemented a new methodology for collecting and reporting FDI statistics, including separate reporting for special purpose entities (SPEs), which are often set up for tax-motivated reasons. These distinctions are important in identifying BEPS from FDI data. Only a few countries currently publish aggregated business sector accounts separating SPEs from other entities.

15. Micro-level data makes separating real and BEPS-related effects more likely, since individual firm data allows adjustment for industry, size of company, situation in the MNE group, and other non-BEPS tainted variables. In other words, analysis with micro-level data makes it possible to identify and control for more, but not necessarily all, non-tax characteristics of both affiliated firms and MNE groups that could affect BEPS.

16. ***Ability to focus on specific BEPS activity***. Differences between tax return and financial accounting data represent an important limitation affecting the use of non-tax financial accounting information for analysis of tax policy issues generally and BEPS specifically. There are three main examples of this distinction. Firstly, book/tax income differences can include permanent exemption of intragroup dividends and timing differences such as accelerated tax depreciation. Parent companies as well as other companies in a MNE group report financial profits that include exempt intragroup dividends. Differences between the tax consolidation rules and the statutory accounting consolidation rules can affect consolidated accounts.

17. A second book/tax difference relevant to BEPS analysis is the tax residence of the company compared to the country of incorporation, where financial reporting is required. Due to differences in international tax rules, some companies have tax residence in a country other than the country of incorporation, or in some cases companies have been able to exploit mismatches between the tax laws of different countries with the result being that they are not tax residents of any country. Also, financial accounts generally do not show the sales or income of an entity across different countries, so analyses generally assign all of the sales and income to the country of incorporation. For example, a branch of a company could be earning income in a low-tax rate country, yet it is reported as income of the company incorporated in a high-tax country, thus distorting both the location of profits and the measure of the tax rate.

18. A third book/tax difference is the actual tax variable. Financial statement accounts under International Financial Reporting Standards (IFRS) or Generally Accepted Accounting Principles (GAAP) include tax expense, which is an accrual measure of tax associated with current year income, and which includes both current and deferred income tax expense.[2] For a constantly growing company, deferred income tax expense may also accumulate over long periods, resulting in a near zero effective tax rate. For example, if three subsidiaries of a MNE are operating in different countries, all of which have accelerated tax depreciation allowances for capital spending, an expansion in capital investment over a ten year period could result in a build-up of significant deferred tax liabilities (for accounting purposes). Also, deferred tax expense can accumulate into deferred tax assets (e.g. tax credit carry forwards) or deferred tax liabilities (e.g. accelerated depreciation), which are affected by changes in future statutory tax rates. The total tax expense will be affected by a one-off change in the year that statutory tax rates are changed, due to a re-evaluation of the deferred tax asset or liability. Cash income tax payments are sometimes reported, but cash tax payments may reflect tax from current and prior years and potentially interest and penalties.

19. In addition, many BEPS strategies cannot be observed directly in financial (accounting) statements, as they rely on heterogeneous classification of legal forms, financing contracts and companies' residence by tax authorities.[3]

20. Current tax return information is not a panacea for all the problems facing an analysis of BEPS. Individual country tax administrators or their tax policy analysis agencies with access to tax return information will only have information included in the tax returns filed in their country. In many cases, this will not include returns for other entities of the worldwide group that do not have to file returns in the country. Detailed information about intra-group related party transactions may not be included since it may not have been requested or may not be required for the computation of tax liability (the latter limitation being legally binding for tax authorities in some countries with respect to the information that can be requested). An additional issue is that all of the information reported on corporate income tax returns may not be included in a database processed from the tax returns (e.g. often only information specific to the calculation of tax liability is included, so information from the balance sheet, which could be helpful in the analysis of BEPS, may not be processed.)

21. ***Level of detail***. The use of firm-level data is more likely to allow for the separation of real economic activity from BEPS and focusing on specific BEPS behaviours. The use of unconsolidated financial account data in combination with consolidated financial account data provides further insights. Where available, information on related party transactions should be used in analysing BEPS. For example, group worldwide leverage and interest expense ratios only include external third-party borrowing. Related party borrowing, which is a significant BEPS channel, does not show up in the consolidated group worldwide financial accounts. Related party borrowing is reflected in unconsolidated affiliates' financial accounts, but is generally not separately reported in financial accounts

22. ***Timeliness of the information***. Access to timely information will enable policymakers to respond faster in countering new BEPS channels that may arise over time. If the time lag is too long, the analysis undertaken will be of more historical interest than for policy action purposes. Financial statement information is publicly available annually, often 2-4 months after the firms' fiscal year has closed. Tax return information is often not filed until late the following year, and the processing of the tax return information for analysis purposes is often 2 years after the calendar year.

23. ***Access to the information***. MNEs file tax and regulatory reports with governments, and those tax reports are available to the tax administration agency. In many countries, the confidentiality of the tax return data prevents any sharing of the information beyond the tax administration agency. In many countries, government tax policy analysis outside of the tax administration may be limited to specific requests for anonymised records or aggregate statistics. Non-government access to corporate tax return records is typically not permitted, except for a few countries and only for strictly controlled research projects with strict confidentiality rules. Aggregate corporate tax return data is published by a number of countries, including information by industry and for certain taxpayer attributes such as total assets or total revenue. Based on information collected in a recent OECD Committee on Fiscal Affairs (CFA) Working Party No.2 survey, only eight of the 37 respondent countries were able to provide data on MNEs' share of corporate income tax revenues.

24. ***Other data issues***. There are many other data issues that reduce the signal-to-noise ratio (real information content) of any empirical tax policy analysis. Analysis must be undertaken with available data, but the analysts and users of the analysis should be aware of the data limitations. A few of the additional data issues related to BEPS analysis include: 1) balance sheets typically reflect purchased intangibles only, since for both tax and financial accounting most expenditures for intangible investments are deducted immediately (expensed) rather than capitalised; 2) headline statutory tax rates are often not the tax rate applicable at the margin of BEPS behaviour, due to specific country tax rules or administrative practices; 3) effective tax rates, both tax paid and financial tax expense, can also reflect specific non-BEPS related incentives, such as R&D tax credits; 4) available data may be collected through a sampling process to reduce the burden on respondents and the processing costs, but this raises issues of appropriate weighting; 5) existing data collection and processing may capture previous profit shifting structures and transactions, but may not capture recent and new structures and transactions to shift profits; and 6) recent data is impacted by the financial crisis and changing macroeconomic conditions

Currently available data for BEPS analysis

25. The table below provides an overview of 10 different types of data sources that have been used to analyse BEPS. It is based on responses to the Action 11 Request for Input, as well as discussions with academics and CFA Working Party No.2 delegates. The data sources range from macro aggregate statistics to micro firm/group level statistics; tax return data; financial account statistics; databases with millions of records; and detailed reports of individual MNEs. Further detail is provided in Appendix A.

Table 1.1: **Overview of the current data sources**

MACRO	National Accounts (NA)	This information measures the economic activity in a country and includes variables such as operating surplus, which may be used in BEPS analysis. It is easily accessible from international organisations, such as the OECD and the IMF. However, the underlying information used to construct the data is itself tainted by BEPS behaviours - meaning that even widely used measures such as GDP will include a BEPS component that is difficult to disentangle. There are significant definitional differences between National Accounts and tax data.
	Balance of Payments (BOP)	BOP statistics include all monetary transactions between a country and the rest of the world, including payments for exports and imports of goods, services, financial capital and financial transfers. This encompasses information on flows widely used to shift profits, such as royalties and interest. It is accessible (from the IMF and the World Bank, for example), but does not distinguish between transactions respecting the arm's length principle and manipulated transactions.
	Foreign Direct Investment (FDI)	FDI statistics cover all cross-border stocks and flows between enterprises forming part of the same group, including (i) direct investment (equity or debt) positions; (ii) direct investment financial flows (equity, reinvestment of earnings, debt); and (iii) direct investment income flows (dividends, distributed branch profits, interest). While not directly related to the scale / revenue loss attributed to BEPS, FDI data depicts intra-group cross-border transactions that can provide at least indirect evidence of profit shifting by analysing the disconnect between the amount of FDI and the size of the economy, or the concentration of FDI in countries with a low effective tax burden on corporations. There are several issues with FDI data, including bilateral asymmetries in the capturing of the same FDI transaction and different types of transactions (e.g. greenfield investment, mergers & acquisitions, intra-group financing). There is also no distinction between real and purely financial investment, with the latter being more relevant for an analysis of BEPS. Changes in data coverage over time can affect trends in macroeconomic variables, such as FDI.
	Trade	Aggregate data on bilateral trade by product can be used to analyse profit shifting through mispricing. This is accessible from the United Nations Comtrade database. However, there can be large discrepancies between figures reported for the same bilateral trade flow by the importing and exporting country (and non-trivial measurement issues concerning quantity and current price trade data),. There is no equivalent database for trade in services, an important element for BEPS analysis. The CEPALSTAT database covers some Latin American countries, but there is no differentiation between related and non-related parties. The raw underlying customs data (expanded on in the micro data section) used for merchandise trade statistics may also show, in some countries, separate figures for trade between affiliated parties.
	Corporate income tax (CIT) revenue	Aggregate tax revenue data is accessible from international organisations (OECD Revenue Statistics, IMF) and often from tax authorities. It is typically used to estimate CIT-to-GDP ratios, for example, as well as implicit tax rates, i.e. ratios of CIT revenues to a proxy CIT base taken from the National Accounts. However, the biggest drawback is comparability across countries. Often, there is no clear distinction between national and subnational revenue, the relative size of the corporate taxed sector, or between resource and non-resource revenue. The lack of detail and consistency is an important issue for developing countries. Recently available data from the International Centre for Tax and Development (ICTD) improves comparability of data for developing countries.[4]

MICRO	Customs (trade) data	Customs data is a useful source for understanding the mispricing of traded goods and services. This is an important component for understanding transfer pricing behaviour by related parties. Availability of such data is country specific and not available in many countries. Studies in France and the U.S. have measured pricing differences between related and non-related parties, by country of destination and product characteristics.
	Company financial information from public / proprietary databases	This information can be sourced from published financial statements of MNEs, open-access sources such as Open Corporates, and commercial databases (e.g. Bureau van Dijk (Bvd) ORBIS and Amadeus, S&P Compustat Global Vantage, Bloomberg, Oriana, Osiris, OneSource, Mergent, Alibaba.com, SPARK, DataGuru.in, Ruslana). Companies (at least public companies) are typically obliged to publish financial statements (consolidated and/or unconsolidated). Three problems with the suitability of this data for BEPS analysis are different reporting requirements for accounting and tax purposes, no distinction between related party and independent party transactions, and the heterogeneity of reporting across countries and companies.
	Company financial information from government databases	Detailed financial information is available (although with limitations applying to access) from publicly administered databases such as the US. Bureau of Economic Analysis and German Bundesbank MiDi database. In some other countries, access to data via research centres or via controlled remote-access/execution is also being considered.
	Tax return CIT information	A range of financial and tax information is available to tax authorities as companies are required to file a tax return. The extent of information reported to the tax administration varies across countries. In some countries, there are strict rules limiting the reported information to that required for the calculation of tax liability only; in other countries, companies are required to file broader information used for risk analysis such as data on foreign subsidiaries. Many governments do not report corporate tax revenues separately for MNEs and purely domestic companies from tax returns, and have no systematic data regarding intra-group transactions. Some countries publish tax statistics that show the data in aggregate or by sector. Full access to the detailed micro-level company tax data is generally restricted to tax authorities, made available often on specific request for tax policy analysis, and in a few countries to outside researchers under strict confidentiality conditions. The OECD is currently reviewing the extent of availability and use of tax return micro-data, as well as access to such data, by National Statistics Offices in OECD countries.
	Detailed specific company tax information	The specifics of individual MNEs' tax situations are becoming public through legislative enquiries, such as in the United Kingdom, the U.S., and more recently Australia. More granular tax information than what is available from the MNEs' financial statements or from global databases (for these companies) has become available. The European Commission has also launched a series of in-depth investigations into specific tax rulings and regimes that could be considered as EU State Aid to MNEs.

Initial Assessment of Currently Available Data for Analysing BEPS

26. Analysis of BEPS requires identifying where MNE behaviours or arrangements "achieve no or low taxation by shifting profits away from jurisdictions where the activities creating those profits take place. No or low taxation is not *per se* a cause of concern, but it becomes so when it is associated with practices that artificially segregate taxable income from the activities that generate it.'' This description of BEPS is important in assessing the currently available data.

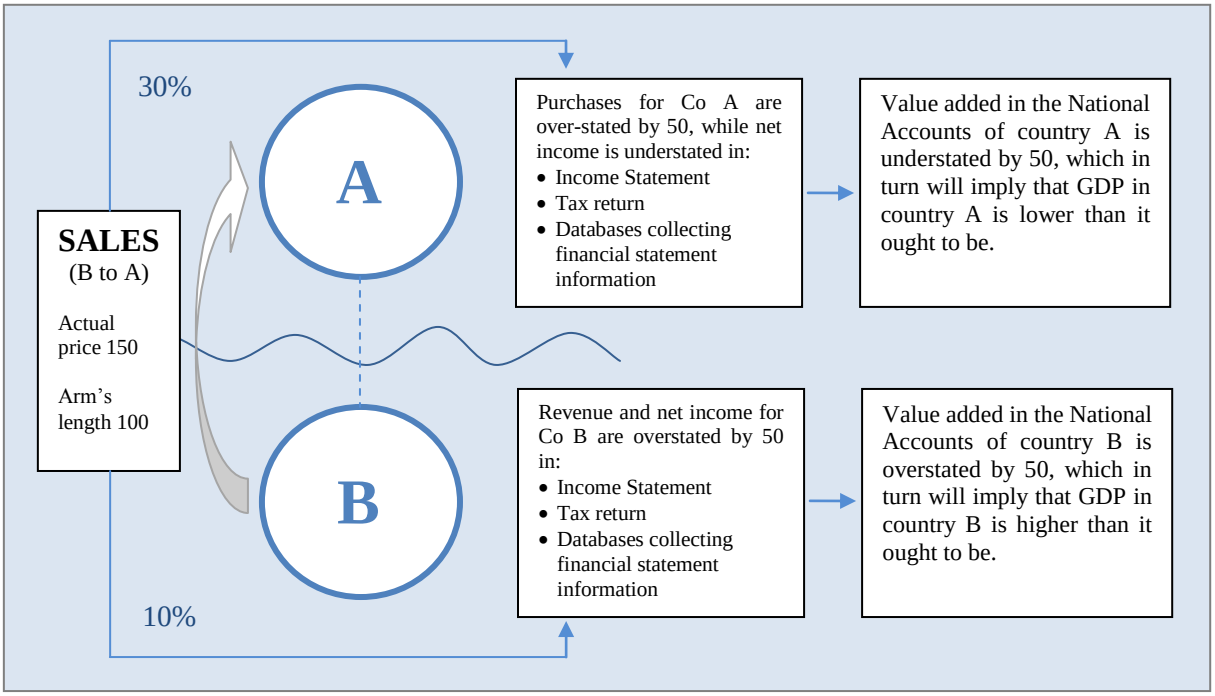
27. ***Firm-level data is needed for the best analysis of BEPS***. Among the economic community, there is general agreement that the increased availability and use of firm-level data is an important improvement in analysing BEPS. Earlier studies of macro aggregate-level statistics found very large reported effects of profit shifting due to tax rate differentials, but aggregate-level statistics are less able to separate real economic activity from BEPS behaviours. Dharmapala (2014) presents a good summary of the existing economic empirical literature and how micro-level analysis better refines the analysis of profit shifting. Academic estimates of the responsiveness of profit shifting to tax rate differentials are generally lower from firm-level financial data than from macro level data or tax return data.

28. As mentioned earlier, publicly-available, private-source micro-data has limitations in analysing BEPS. The proprietary databases integrate publicly-available financial information reported to various governmental agencies. The coverage and completeness of the data varies significantly across countries. In addition, the available financial information reflects accounting concepts, not tax return concepts. As a result, these databases still provide only indirect information about the presence of BEPS (tax return data would provide a more direct source of information). In addition, the ability of researchers using this firm-level data to isolate BEPS depends critically upon the empirical methods used to control for any differences in profitability explained by real economic factors.

29. National Accounts statistics, such as FDI and royalty payments, can provide some insights into transactions that can be part of arrangements to shift profits, so can thus be potential indicators of the scale of BEPS, but better estimates of the scale and economic effects of BEPS require micro-level data (importantly, the same micro-data used to create the National Accounts). Improving the data and analysis of BEPS is also important for sound, evidence-based fiscal and monetary policies – government policymakers (fiscal) and central banks (monetary) rely heavily on macroeconomic statistics that are currently tainted by BEPS behaviours (Lipsey, 2010).

30. Figure 1.1 illustrates how BEPS behaviours affect corporate tax payments and company financial accounts, and also countries' National Accounts. Company A is located in Country A that has a statutory tax rate of 30%, while Company B, its affiliate, is located in Country B with a statutory tax rate of 10%. Company B sells goods to Company A for 150 that would have been sold for 100 to an independent party. As a result, the sales in Company B are overstated by 50 while the purchases in Company A are overstated by 50. This has ramifications for the value added measures in the National Accounts by overstating valued added in Country B and understating valued added in Country A. This example shows how BEPS behaviours can distort GDP figures across countries. Only very few National Statistical Offices are able to adjust even partly for this distortion, especially in cases concerning payments for (if recorded) and transfers of intellectual property.

Figure 1.1: **Example of non-arm's-length transfer pricing affecting National Accounts and firm-level reports**



31. ***More complete information about global MNE activity is needed to analyse BEPS***. Analysing BEPS would benefit from seeing the complete picture of the activities of the MNE and its related entities. Many tax administrations currently only receive tax returns for the MNE entities required to file taxes in their country. They might not have access to information about related party affiliates undertaking transactions with the taxpayer in their country. The incomplete picture can often result in BEPS behaviours not being transparent for identification and quantification. Similarly, an incomplete picture of a MNE's financial arrangements can obscure BEPS behaviours from researchers using financial accounts.

32. Incomplete coverage of a MNE's economic activity across countries is particularly problematic for analysis of BEPS if the coverage is non-random. In that case, the sample of business entities may not be representative of the overall population. The potential for non-representativeness in analysing BEPS is likely to occur in two particular situations.

33. First, if the missing businesses or activities are in either high-tax rate or low-tax rate countries. Since BEPS is about profit shifting from high-tax to low-tax or no-tax rate countries, arrangements to segregate profits from real economic activity would be most likely to show up in those entities. For example, large reported profits in no-tax countries with little if any real economic activity would be a result of BEPS.

34. Second, entities engaged in BEPS behaviours may be less likely to report any corporate holdings, offshore structures or activity that could highlight their BEPS actions to tax authorities or publicly available sources, where their activities may become subject to media and public attention. This may be because there is often discretion in some of the public reporting (e.g. materiality exceptions), or the penalties for non-reporting may be small relative to the benefits of avoiding disclosure of tax and financial information that may include evidence of BEPS behaviours. Hoopes (2015) summarises academic research on issues of disclosure and transparency, including several studies[5] with regard to geographic / segment reporting, which have found selective disclosure particularly by tax aggressive MNEs.

35. It should also be noted that some MNEs are voluntarily becoming more transparent in their tax reporting. The driving forces behind this have been the Extractive Industries Transparency Initiative (EITI), requirements by the European Commission, and good governance motives.

36. An additional concern about incomplete coverage and lack of representation arises if BEPS behaviours differ across countries, but the available data is only a sample of the entire population, and coverage differs by country. This has been noted by Cobham and Loretz (2014)[6] with respect to tax policy analysis of developing countries. A recent IMF analysis concluded that developing countries are likely to have significantly higher BEPS concerns than developed countries due to lower tax administrative capacity to stop BEPS behaviours. Also, many studies of profit shifting are based on the Amadeus database, which includes only European countries, so the results may not be applicable to non-European countries.

37. The most comprehensive (and widely-used by researchers) global database is the proprietary BvD ORBIS database. It is an extensive database of almost 100 million financial accounts from many countries, and is being continually updated, expanded and improved. Although a useful global database, it has limitations,[7] and is based upon financial account rather than tax return data. With respect to its representativeness for the purposes of BEPS empirical analysis, Cobham and Loretz (2014) note the Eurocentric nature of the sample and its weakness in coverage of low-income countries. The table below is a summary of the Cobham and Loretz data analysis, plus a comparison to the geographic distribution of both the Fortune Global 500 MNE groups and GDP.

Table 1.2: **Regional distribution of MNE subsidiaries in Orbis by location of subsidiary and group headquarters, compared with regional distribution of top 500 MNE groups and GDP, 2011**

	Location of Subsidiary						%
Location of the group headquarters	Europe	North America	Australasia	Latin & Central America & Caribbean	Middle East & Africa	Total	Representation by location of group headquarter
Europe	208,048	9,933	3,451	1,465	835	223,732	*69%*
North America	28,901	23,095	2,363	803	125	55,287	*17%*
Australasia	9,303	4,624	20,318	276	84	34,605	*11%*
Latin & Central America & Caribbean	3,910	556	432	672	11	5,581	*2%*
Middle East & Africa	2,349	297	75	32	567	3,320	*1%*
Total	252,511	38,505	26,639	3,248	1,622	322,525	*100%*
% Representation by location of subsidiary	*78%*	*12%*	*8%*	*1%*	*1%*	*100%*	
Fortune Global 500[1]	*29%*	*28%*	*41%*	*3%*	*0%*	*100%*	
GDP[2]	*27%*	*24%*	*34%*	*8%*	*7%*	*100%*	

Notes:

1. Regional distribution of top 500 companies in 2014 (Fortune Magazine)

2. GDP from IMF (current 2011 prices; 2011 used to compare with latest year used by Cobham and Loretz from Orbis)

Source: Cobham, A. & Loretz, S. 2014. International distribution of the corporate tax base: Implications of different apportionment factors under unitary taxation

38. For example, the table shows that MNEs headquartered in Europe accounted for 69% of the affiliates in the Orbis database; in comparison, MNEs from the rest of the world accounted for only 31%. Of the total affiliates with key financial information included, 78% were in Europe, while 22% were located in the rest of the world. This is only a summary of the number of firms, and does not indicate how representative the database is in terms of economic activity or taxes. The lack of representative data is likely to be worse for developing countries. Furthermore, it does not indicate whether actual data is available for all the firms included.

39. Many academic studies have observed and estimated the existence of profit shifting (including profit shifting from specific BEPS channels) with limited financial accounts data, and in a few cases using

tax return data, as described in Chapter 3. Importantly, these studies find that BEPS is occurring and the extent of BEPS is large and statistically significant. The limitations of the currently available data are problematic in estimating the global scale and economic impact of BEPS. There is concern that sample selection may result in underestimation of findings on aggregate profit shifting.[8] Other studies include both BEPS and individual tax evasion in their analyses of BEPS and are thus likely to overstate the scale of BEPS.

40. Recent public enquiries by legislative and/or parliamentary committees, such as in the United Kingdom, the U.S., and more recently Australia, into the tax strategies of some high profile MNEs, have shed significant light on the tax affairs of the affected parent companies and their affiliates.[9] In addition, the European Commission has launched a series of in-depth investigations into specific tax regimes that could be considered as EU State Aid to MNEs. Investigative journalism has also brought much useful information into the public domain.

41. What is striking is that when one looks into the micro-data available, much of this newly revealed information does not appear to be visible – either because certain affiliates are not included or, where they are included, the financial information is missing. This reveals a clear disconnect between the information revealed through targeted public enquiries of some MNEs and the limited available tax information for those same MNEs from consolidated financial statements. Box 2 explains this further.

Box 2. Public enquiries reveal data missing from many academic studies

Evidence emerging from several recent public enquiries into the tax affairs of a number of high profile MNEs reveals clear deficiencies in the available data sources used by researchers in analysing BEPS. The public enquiries revealed new information on the earnings, structure and tax affairs of parent companies and their affiliates. The table below shows an example of one of the MNE's reported pre-tax income.

The parent company, X, located in a high-tax jurisdiction, reported between 29 and 43 percent of pre-tax earnings for the years 2009 to 2011. X's affiliate, Y, located in a low-tax jurisdiction, earned nearly two-thirds of the group's total pre-tax income in 2010 and 2011, and half of the total in 2009.

Global Distribution of Specific MNE reported Earnings

Entity	Location	Pre-tax income		
		2011	2010	2009
		%	%	%
X (Parent)	High tax country	31	29	43
Y (Affiliate)	Low tax country	64	65	50
Other		5	6	7
Total		100	100	100

While Affiliate Y earned the majority of the pre-tax income, it paid virtually no taxes to any government for these three years. Due to different rules for determining tax residence, a key entity incorporated in the low-tax country was not taxable in any country. Thus, several tens of billions of the parent's local currency were only taxed at a 0.06% tax rate over three years.

In a micro-database used by many researchers to analyse BEPS, the financial information for the key affiliate (Y) in the low tax country was missing. This reveals a clear disconnect between the information revealed through targeted public enquiries of some MNEs and the incomplete available financial information for those same MNEs from financial accounts. Much of the important information for tax analysis is simply absent. The fact that such observed instances of BEPS are not visible in firm-level financial account databases highlights concerns regarding the reliability and representativeness of one of the most frequently used existing data sources.

42. ***Additional analysis of tax return information is needed***. As noted above, significant differences exist between tax return information and financial accounts, which make financial account information problematic as a sole source for analysing BEPS, even if it was comprehensive.

43. Tax return information submitted to individual countries is also not comprehensive in terms of the full picture of the MNE group, but it is unlikely to be subject to non-random reporting due to the significant financial penalties for tax non-compliance. Tax return data will have accurate information about the country of tax residence, taxable income, tax paid, tax credits, and tax consolidation, which reduces significant noise present in financial accounts.

44. Although significant data from tax returns is provided to tax administrations by companies, much of the data is not processed and incorporated in databases for tax policy analysis purposes. In a survey by the OECD CFA Working Party No.2, a majority of countries cited lack of data as the key constraint in analysing BEPS. Most of the 37 respondent countries reported that corporate tax returns are in a database, although corporate tax data for tax policy analysis is often available in aggregate form or upon request for individual companies. Only eight countries were able to report the aggregate corporate income tax collections from MNEs. Thus, although corporate tax return data has been provided by companies to government tax administrations, it is not currently available in easily accessible form for tax policy analysis.

45. ***Making the most of available information and identifying gaps***. Companies and governments are being required to do more with less under tight budgetary constraints. Compliance burdens and tax administrative costs are significant, and additional information should only be requested and processed if the benefits exceed the costs. Information collection where possible should be aligned to current recordkeeping and reporting of MNE business to assure better data integrity and minimise compliance costs.

46. Much of the academic work that has been done and the interest shown in doing more is constrained by lack of access to micro-data that is representative of entities in an individual country or across countries, and that is not missing critical information. This is equally true in some instances for government analysts, who could do more tax policy analysis with access to better data, but in many countries the degree of granularity (for example, separating MNEs from purely domestic corporations) is not sufficient, and availability of disaggregated data is quite different across countries.

47. In many cases, information has been provided by businesses to tax administrations, but the data are not processed and are not presently available for tax policy analysis. With increasing use of electronically filed tax returns, the cost of processing the filed information will be reduced, but will still be significant for many countries. Nonetheless, maximising the information and insight from currently provided data, based on best practices in several countries would be beneficial. The Action 11 Request for Input and the CFA Working Party No.2 survey identified what could be considered as some best practices to improve data collection, processing, and economic analysis in several countries, which are briefly described in Box 3.

Box 3. Some current best practices in using available data for BEPS analysis

Germany – The Deutsche Bundesbank houses the Micro database on Direct Investment (MiDi), which is a full census of foreign firms' affiliates in Germany. It covers directly or indirectly owned foreign affiliates of German parent companies above a certain size and ownership threshold, including affiliates in developing countries. It contains unconsolidated (sometimes consolidated) balance sheet data at the firm level, ownership variables (links between affiliates and parent company), as well as other useful information such as liabilities to shareholders and (or) affiliates; total balance sheet of affiliates and parent company; and shares in the assets and liability positions of non-residents. The data includes profit after tax, but does not include other income statement information, such as taxes or income/expense information for analysing specific BEPS channels. The MiDi data is confidential and available only on site at the Research Centre at the Central Office of the Deutsche Bundesbank in Frankfurt for approved research projects and under strict confidentiality rules.

Sweden – Government analysts in Sweden have access to detailed, anonymised taxpayer information from filed tax returns. The firm-level information also includes balance sheet information, the number of domestic employees, employee compensation, and the value of tangible and intangible assets. The data distinguishes between MNEs and purely domestic firms, with a further breakdown available by sectors. Information on foreign source income and related party transactions (e.g. controlled foreign corporations), and the amount of R&D expenditures undertaken in the country is not captured in tax returns. A useful practice that could be replicated in other countries is using information available from other sources, such as commercial sources to supplement the government's database. However, the Swedish data lacks detailed income information on foreign subsidiaries.

United States – The US Bureau of Economic Analysis (BEA) surveys both US headquartered firms (and their affiliates abroad) and foreign headquartered firms with affiliates in the United States. Both surveys are done on an annual basis. MNE firms operating in the United States are required by law to respond to these surveys, but the survey information is not shared with tax or financial reporting authorities, and confidentiality is assured. The aggregated data are publicly available, and the micro data can be accessed by non-government researchers under strict confidentiality rules. The current data does not enable full consolidation and can include some double counting of affiliated entities.

The US Internal Revenue Service (IRS) collects tax return information on controlled foreign corporations (CFCs) of US parents, plus tax return information on US subsidiaries of foreign parents. Some of the tax return data is compiled and tabulated for published aggregate tables, and compiled data is available for certain government analysts plus certain approved non-government researchers. The CFC data is important in tax policy analysis, but has limitations in linking all affiliated entities.

48. In 2011, the OECD Expert Group for International Collaboration on Micro data Access was formed to examine the challenges for cross-border collaboration with micro data. The resulting 2014 report[10] notes: "*The challenge in the 21st Century is to change practices in access to micro data so that the access services can cross borders and support trans-national analysis and policy making. This is necessary to reflect the increasingly international (global) reach and impact of comparative analysis and shared policy making*."

49. Instead of suggesting new legislation, substantial new infrastructure, or new technology for doing so, the report seeks smarter deployment of what already exists in most OECD countries. Of course, in the micro-level tax return data context for BEPS, data collection, dissemination and access is still not ideal. The report highlights the importance of comparability and thus working towards homogeneity in data collection across countries. It states that regional and international shared policy making needs the support of evidence drawn from comparative analysis and/or the combined data of the national parties to the collaboration. Working with available firm/group-level financial statements, for example, reveals the heterogeneity across reporting standards for accounting purposes worldwide as well as the way groups choose to report certain items like sales, assets, profits and employees and how detailed a breakdown is available by geography or segment. There are also vast differences in the mandatory information required by different tax authorities.

50. It is important to emphasise that in most cases BEPS must be estimated rather than directly observed from tax returns, financial accounts or customs records. For example, identifying deviations from arm's-length pricing is a highly fact-intensive analysis. Analysis of customs data for individual product pricing must distinguish between sales to related parties and third-parties, and analysis of relatively unique transfers of intangible assets requires analysis of "comparable" transactions. Comparisons of profits and effective tax rates across thousands of companies require sophisticated statistical analysis to truly separate tax from real economic activity. Simple descriptive statistics can only provide indications, rather than correlation or causation, of potential BEPS behaviours, and statistical analysis of large databases may also only be able to provide rough measures or indications of BEPS due to current data limitations. Nonetheless, analysis of available data by statistical and economic analysis will provide additional insights beyond descriptive statistics.

51. Processed corporate tax return information for MNEs and their foreign affiliates have been analysed by governments and, in some countries, academic researchers. Linkage of tax return information with other business administrative records within governments could increase the insights from existing data. However, access to existing tax return information for tax analysis purposes is not always possible. In addition, many government tax policy agencies and tax administrations have limited resources to conduct empirical statistical and economic analysis. Some countries provide good examples of what can be achieved as there are cooperative research programmes between government and academics for analysis of data under strictly controlled and confidential circumstances by academics with specific research programmes. This promotes robust economic and statistical analysis based on access to firm-level data.

52. Although having a large database with many observations is helpful for statistical analysis, such a database may exclude important available information. Sometimes the quality and depth of an analysis is more insightful than the quantity of observations providing a non-random and/or less in-depth analysis. Thus, although examples of BEPS behaviours by some major MNEs should not be extrapolated to all MNEs, detailed information from public enquiries should be considered. One question is whether the entities and behaviours described in those accounts are captured in the existing databases used for economic analysis of BEPS. Finally, this initial assessment of the currently available data for economic analysis of BEPS and potential countermeasures has begun the identification of data limitations, data issues, and in some cases data gaps.

53. A set of questions is included below to test whether this chapter adequately captures and assesses the data currently available for analysing BEPS and BEPS countermeasures.

Questions for consultation

- Are there any additional criteria that should be used in assessing data for analysis of BEPS?

- Are there other data sources not described in this chapter that would add significantly to the analysis of BEPS? If yes, what are these data sources? Are these data currently collected, is their coverage comprehensive and, if data covers more than one country, is the data representative across the countries? Are they available for analysis, and if so, who can access them?

- Do you believe existing data is sufficient to perform reliable analyses of BEPS and countermeasures? If yes, why? If no, what data is needed to undertake a comprehensive analysis of BEPS and countermeasures?

- Are there other "best practices" that governments could feasibly institute to improve coverage and/or access to existing data?

Annex 1

DATABASES

Table A.1: **Current macro- and micro-data availability for analysing BEPS**

	Data	Source	In the BEPS analysis context	Access
MACRO	National Accounts	1. OECD 2. IMF	Measures the economic activity in a country and includes variables such as corporate operating surplus, which might be used in BEPS analysis. However, the underlying information used to construct the data is tainted by BEPS behaviours - meaning that even widely used measures such as GDP will include a BEPS component that is very difficult to disentangle.	Anyone can access this information
	Balance of Payments Statistics	1. IMF BOP Statistics 2. World Bank Development Indicators	Records all monetary transactions between a country and the rest of the world. Transactions include payments for the country's exports and imports of goods, services, financial capital and financial transfers. Includes information on flows widely used to shift profits, such as royalties and interest. BOP data cannot distinguish between transactions respecting arm's length principles and manipulated transactions.	Anyone can access this information
	Foreign Direct Investment	1. OECD FDI Statistics 2. IMF Coordinated Direct Investment Survey (CDIS)	Foreign direct investment is a cross-border investment made by a resident in one country with the objective of establishing a lasting interest in an enterprise that is resident in another country. FDI statistics cover all cross-border stocks and flows between enterprises forming part of the same group, including: • Direct investment position (stock) that can be equity or debt • Direct investment income flows (dividends, distributed branch profits, reinvested earnings, interest on debt) • Direct investment financial flows (equity, reinvestment of earnings or debt) While not directly related to the scale / revenue loss attributed to BEPS, FDI data depicts intra-group cross-border transactions that may provide indirect evidence of profit shifting by analysing the disconnect between the amount of FDI and the size of the economy, or the concentration of FDI in countries with a low effective tax burden on corporations. The IMF only reports on FDI positions, not flows, and the amount of information available from individual countries differs. The OECD has information on both FDI positions and flows, but there are gaps and inconsistencies. Several issues with FDI data are listed below: • Includes different types of transactions such as greenfield investment, mergers & acquisitions, intra-group financing and reinvested earning. A further breakdown of FDI data would be needed to distinguish real from purely financial investment.	Anyone can access the aggregated information, while access to disaggregated data sources is limited (see the section on 'best practices')

	Data	Source	In the BEPS analysis context	Access
			• Aggregate inward or outward FDI data for a particular country are available for many countries, but bilateral flows between two countries are quite often confidential. • Differences in definitions among countries – one country might consider a particular transaction to be FDI while the other country might consider it a portfolio investment. Hence, investment from country A to country B reported by country A as an outward investment does not equal the same investment reported by country B as an inward investment. The availability of macro data on financial accounts and trade in services and the level of detail differ between countries, restricting the suitability of such data for a comprehensive assessment of BEPS. Data from the IMF's Coordinated Direct Investment Survey lack sufficient detail to compare profit declaration with value creating activity.	
	Trade statistics	1. United Nations Comtrade 2. CEPALSTAT Database	Trade in services by country is usually available with data segregated by royalty payments and entrepreneurial services, among others. Even when it is not available per trading partner, this information could also be considered for global studies on the growth of such payments and complement other studies on the use of such mechanisms for profit shifting. However, the availability of macro data on trade in services and the level of detail differ between countries, restricting the suitability of such data for a comprehensive assessment of BEPS. In addition, there often appears to be some difficulty in practice in how NSOs differentiate between payments recorded as trade in services and payments recorded as primary income flows in the Balance of Payments, which can result in significant differences in bilateral trade statistics. Comtrade contains annual trade statistics starting from 1962. Aggregate data on bilateral trade in goods can be used to analyse potential profit shifting through trade mispricing. However, the data are not always of high quality – there can be large discrepancies between figures reported for the same bilateral trade flow by the importing and exporting country. There is no equivalent database for trade in services, an important element for BEPS analysis. The CEPALSTAT database provides data on products, prices, volumes, insurance and transport costs, and countries of destinations for some Latin American countries; however the data does not differentiate between related and non-related parties.	Anyone can access this information

	Data	Source	In the BEPS analysis context	Access
	Corporate income tax revenue statistics	1. OECD Revenue Statistics 2. IMF Government Finance Statistics 3. International Centre for Tax Administration: Government Revenue dataset 4. Individual country aggregate revenue statistics	Tax revenue data are macro-level aggregate statistics compiled by individual country tax authorities, and compiled across countries. Used in international comparisons of corporate tax revenue - to - GDP ratios. In some countries, aggregate corporate tax statistics are available by industry and other groupings. BEPS involves cross-border transactions with all countries and requires comparable data for both developed and developing countries. Currently the limited availability of government revenue data is constraining robust analysis of tax revenue trends and assessments of the tax base of developing countries. Data on government sector receipts and on taxes in particular, are basic inputs to most structural economic descriptions and economic analyses and are increasingly used in international comparisons. The OECD Revenue Statistics presents a conceptual framework to define which government receipts should be regarded as taxes and to classify different types of taxes. They present a unique set of detailed and internationally comparable tax data in a common format for all OECD countries from 1965 onwards. The Revenue Statistics is being expanded to include non-OECD countries in other regions. *Revenue Statistics in Latin America* is a joint publication by the OECD, the Economic Commission for Latin America and the Caribbean (ECLAC), the Inter-American Centre of Tax Administrations (CIAT) and The Inter-Development Bank (IDB). It provides internationally comparable data on tax levels and tax structures for a selection of Latin American and Caribbean (LAC) countries. Work on Revenue Statistics in Asia was published in 2014. These new publications will greatly enhance comparability across a wide range of countries. The IMF's Government Finance Statistics (GFS) and World Bank's Global Development Indicators database does not collect consistent and comparable tax revenue information – often there is no distinction between revenue collections from central government and other levels of government. Somewhat more detailed data are available in the 2010 African Economic Outlook and 2014 tax surveys conducted together with the OECD and the African Development Bank, or the 2014 Latin American Economic Outlook, which includes data collected by the Economic Council for Latin America and the Caribbean (ECLAC). However, no similar regional database is available for developing nations in Asia, coverage for Latin American and African countries is far from complete, and for countries that are covered, separate data for withholding tax revenues are often not available. This limits possibilities for a comprehensive assessment of trends in corporate tax revenues. An effort by the International Centre for Tax and Development (ICTD) at Sussex University's Institute for Development Studies (IDS) has combined the above-mentioned sources with additional data from IMF's Article IV surveys into a comparable database, greatly improving data coverage across developing countries, while also drawing a clear distinction	Anyone can access this information

	Data	Source	In the BEPS analysis context	Access
			between resource and non-resource sources of tax revenue. The database has been described as "an intermediate measure for improving the quality of government revenue data. In the presence of major challenges with existing data, it offers a dramatically improved foundation for immediate research and policy advice. However, over the long term the task of constructing a complete, reliable and sustainable cross-country government dataset, suitable for high-quality research, is best undertaken by international organisations themselves."[11] Separate data on corporate income tax revenues are available for many countries in the database, though not yet for all of them.	
MICRO	Company financial information	1. Published company financial statements 2. Commercial databases 3. Open access databases	In many countries, companies (or at least some companies, typically publicly listed corporations) are obliged to publish their financial statements. Financial statements may be prepared on the level of the whole group, i.e. consolidated financial statements, and/or on the level of individual subsidiaries, i.e. unconsolidated financial statements. Their main purpose is to provide information to investors. Two main problems with this data are differing reporting requirements for accounting and tax purposes, and heterogeneity of reporting across companies and countries. Company financial statements are commonly used in research on effective tax rates (ETR).[12] Calculations of ETRs over time would be relevant in calculating the impact of BEPS and effects of measures to combat it. However, this source has limitations since financial account information can differ in significant ways from actual tax return information, including location of the activity, measure of profits, measure of taxes, etc. Company financial statements are also used in research on profit shifting through debt financing.[13] An important limitation in these studies is the limited country coverage and comparability across countries. Databases that consolidate companies' balance sheet and income account data (proprietary databases are more developed than open sources such as OpenCorporates) are improving their coverage over time, but still have weak coverage of developing countries in particular[14], but also of some OECD countries[15], such as Germany. This is because data availability in larger datasets depends on underlying national sources. A further drawback is the level of consolidation available for some countries. Examples of such databases include ORBIS, Amadeus, Bloomberg, Oriana, Osiris, OneSource, Mergent, Alibaba.com, SPARK, DataGuru.in, and Ruslana	This data is generally publicly available, but requires consolidation for analysis. Several commercial and open-access databases include significant data for a number of countries, but remain far from comprehensive.
		4. Databases administered by public authorities	Detailed financial information is available (although with limited access) from publicly administered databases such as the United States (US) Bureau of Economic Analysis and German Bundesbank MiDi database.	Access to this information is restricted in both countries.
	Corporate income tax	1. Tax authorities	Non-public tax return information: Companies subject to corporate income tax in	Micro level tax data is accessible to government

	Data	Source	In the BEPS analysis context	Access
	returns		individual countries are required to file a tax return, which contains a range of financial information about the company. Many countries publish tax statistics containing data from corporate income tax returns in aggregate form or broken down into various groups (by sector, income level etc.). The extent of information reported to the tax administration varies across countries. In some countries, there are strict rules limiting the reported information to information directly related to the calculation of tax liability only, in other countries, companies are required to file broader information used for risk analysis such as data on foreign subsidiaries. Aggregate-level published data could be used, for example, for research relating to the effective tax rates paid by different industrial sectors and countries. Some tax authorities, such as in Argentina, request companies to present special forms with information relating to transactions with related parties as well as with entities located in non-cooperative jurisdictions, and non-related parties, covering trade in goods: prices, volumes and trading partners. Some Latin American countries share data extracted from these forms (e.g. effective tax rates, intragroup transactions, and transactions with parties located in tax havens) with international organisations, such as the CIAT, upon request, even if they are not shared with the public. This could mean that there are opportunities for such data on developing countries to be constructed by international organisations. **In some countries, such as the US, researchers have been given access to the databases of revenue authorities under controlled conditions.	analysts in most cases; however, this differs across countries. External researchers have even less access to any micro level tax data than government analysts
	Detailed specific company tax information:	1. Public enquiries by legislative and parliamentary committees	The details of individual MNEs' tax arrangements and affairs are becoming public through legislative and parliamentary enquiries, such as those occurring in the United Kingdom, the US, and more recently in Australia. More granular information than what is available from the MNEs' financial statements or from global databases (for these companies) has become available through these enquiries. The European Commission has also launched a series of in-depth investigations into specific tax regimes that could be considered as EU State Aid.	Information obtained by the U.S. Committee, for example, is available online.
	Customs (trade) data	1.Customs agencies	Customs data is a useful source of information for analysing transfer pricing activities to compare prices used by MNEs with related and non-related parties, by country of destination and product characteristics.	This is country specific and not available in many countries. There is also likely to be restricted use of the data.

Chapter 2

DISCUSSION OF POTENTIAL BEPS INDICATORS

Key points:

- While there is a large and growing body of evidence of the existence of BEPS, through empirical analysis and specific information relating to the affairs of certain MNEs that has emerged from numerous legislative and parliamentary enquiries, the scale of BEPS and changes in BEPS over time are difficult to measure.
- This chapter outlines a number of potential indicators that may assist in tracking the scale and economic impact of BEPS over time and examines some of the strengths and limitations of these indicators.
- The use of any indicators to identify the scale and economic impact of BEPS can only provide "general indications" and the interpretation of any such indicators must be heavily qualified by numerous caveats.
- The usefulness of indicators in identifying the scale and economic impact of BEPS and tracking changes in BEPS over time is greatly affected by the limitations of available data.
- While no single indicator is capable of providing a complete picture of the existence and scale of BEPS, a collection of indicators or a "dashboard of indicators" may be constructed to help provide broad insights into the scale and economic impact of BEPS and provide assistance to policymakers in monitoring changes in BEPS over time.
- This chapter also provides some example calculations for selected indicators, using samples of existing available data. The sample data used to produce these calculations are affected by the considerable limitations of existing available data sources described in detail in Chapter 1. As a result, the example calculations are designed to be illustrative rather than definitive, as the insights that can be discerned from these examples are greatly affected by the limitations of the existing available data.
- Future access to more comprehensive and improved data would allow much greater insight to be obtained from the use of the indicators proposed in this chapter.

Introduction

54. One of the key components of Action 11 is the development of "indicators" that can be used to identify the scale and economic impact of BEPS, to track changes in BEPS over time and to monitor the effectiveness of measures implemented to reduce BEPS.

55. The first step in developing useful indicators of BEPS is defining the concept. BEPS relates to arrangements that achieve no or low taxation by shifting profits away from the jurisdictions where the activities creating those profits take place or by exploiting gaps in the interaction of domestic tax rules where corporate income is not taxed at all. No or low taxation is not *per se* a cause of BEPS, but becomes so when it is associated with practices that artificially segregate taxable income from the activities that generate it. The important distinguishing characteristic of BEPS is tax planning strategies that result in a disconnect between the geographic assignment of taxable profits and the location of the underlying real economic activities that generate these profits. As a result of this disconnect, MNEs may be able to shift profits from higher-taxed countries to lower-taxed countries without a corresponding material change in the way the taxpayer operates, including where products and services are produced, sales and distribution occur, research and development is undertaken, and how the taxpayer's capital and labour are used.

56. An overriding objective in the construction and analysis of BEPS indicators in Action 11 is to develop metrics that help portray the extent of practices that artificially segregate taxable income from the activities that generate it.

Indicator Concept

57. Dictionary definitions of indicators include:

- An index that provides an indication, especially of trends;
- A meter or gauge measuring and recording variation;
- A device to attract attention, such as a warning light;
- An instrument that displays certain operating conditions such as temperature;
- A pointer on a dial showing pressure or speed.

58. As with any gauge, the degree of precision depends on the available information and the accuracy of the measurement tools. Given currently available data and distortions caused in that data by BEPS which is being measured, at this stage potential BEPS indicators can only provide some general insights into the scale and economic impact of BEPS, but will necessarily lack the precision that may become possible if more comprehensive and improved data sources were to be used in the future (see Chapter 1 for a detailed assessment of the limitations of currently available data). More refined analysis and estimates of BEPS, based on multi-variate statistical estimation, are possible with currently available data, but also involve significant uncertainties and limitations (see Chapter 3 for a detailed examination of the approaches to undertaking such estimation). Over time, the proposed indicators will provide a general sense of the trend in a number of key metrics associated with BEPS behaviours.

59. The concept followed in developing the BEPS indicators is to create a "dashboard of indicators" that can provide an indication of the scale of BEPS and help policymakers monitor changes in the scale of BEPS over time. The indicators are crude proxies for a more refined and sophisticated estimate of the dimensions of BEPS. Given currently available data, indicators are probably the appropriate approach to showing consistent trends on the general scale of BEPS. Multiple indicators can help identify trends regarding the scale of BEPS and changes in BEPS and specific BEPS behaviours. An important

requirement of an indicator is that it provides more signal than noise in measuring the scale of BEPS. To the extent that various potential indicators provide the same signal (i.e., a high correlation) on the same dimension, then only the clearest indicator should be used.

60. While no single indicator can be used to provide a complete picture of the scale or economic impact of BEPS, if a number of separate indicators referring to different dimensions are pointing in the same direction, they may provide more solid information on the presence of and trends in BEPS.

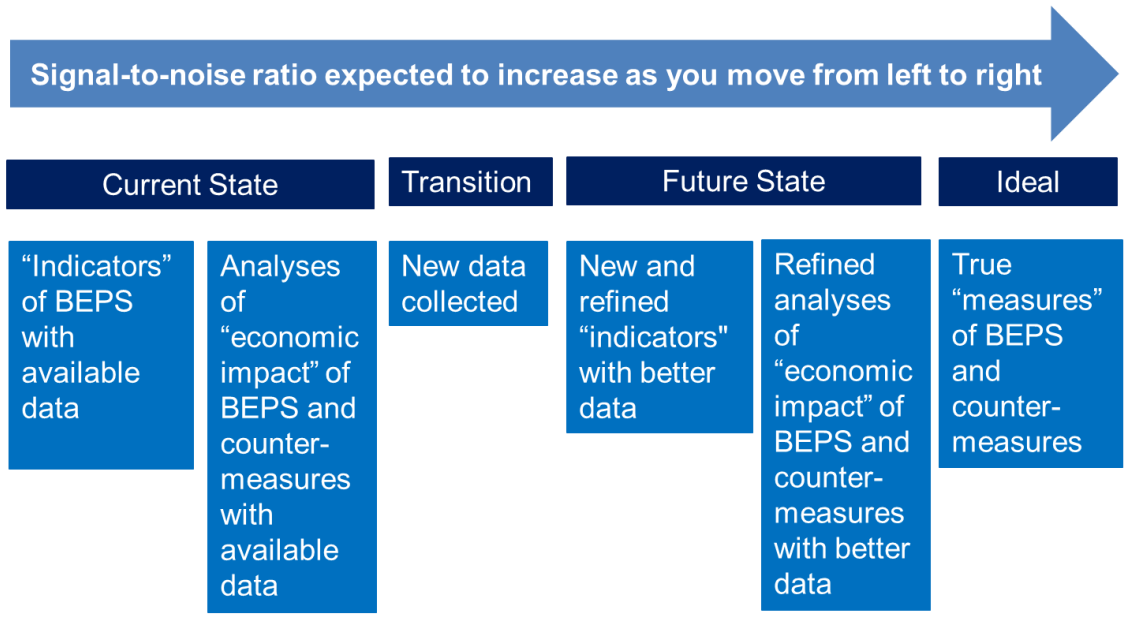
Indicators as a Component of Action 11

61. The following chart provides an overview of the different analyses to be carried out under Action 11. This chapter discusses potential BEPS indicators that can be developed from current data, which is identified as the "current state" category in the chart. Also included here is the analysis of the scale and economic impact of BEPS that is being addressed in Chapter 3 on the economic analysis of BEPS. The current data limitations are a significant challenge to the development of both indicators and economic analyses. Even within tax administrations there is limited information on the operations of MNEs. In a recent country survey conducted by the Committee on Fiscal Affairs' Working Party No.2 on BEPS-related research, only eight countries, out of 37 respondents, could report the total amount of tax revenue collected from MNEs operating in their country.

62. Over time, to the extent that new data sources become available, it is expected that more accurate estimates of the scale and economic impact of BEPS and the impact of countermeasures will be possible. Many of the proposed indicators in this chapter have been developed not only with existing available data in mind, but with a view towards how such indicators could be enhanced if more comprehensive and improved data were to become available in the future. The "future state" in the chart represents what would be considered the next step in the development of more effective BEPS indicators and estimation methodologies. In this "future state", many of the proposed indicators would provide even more insight and more targeted indicators and deeper economic analyses could be developed from the emergence of new data sources. In the "ideal state", the proposed indirect indicators of BEPS would evolve into more accurate, direct estimates of BEPS and the effectiveness of the BEPS counter-measures. In the "ideal state", additional and more comprehensive information derived from actual tax return data would be necessary to achieve the most precise estimations of BEPS and its economic impact.[16]

63. One important outcome of developing potential BEPS indicators with currently available data will be a clearer understanding of the usefulness and limitations of the current data. These insights are discussed in more detail in Chapter 1's assessment of current data. Such an understanding will be helpful in considerations of what future new data might be needed.

Future Path of BEPS Measurement



Guidelines for Indicators

64. The following are specific guidelines that were used in developing BEPS indicators.

65. ***A number of different indicators should be included to form a "dashboard of BEPS indicators"***. Multiple indicators showing the general scale of BEPS and particular BEPS channels are needed given limitations in currently available data. The initial list of possible indicators includes indicators based on both macro (aggregate) and micro (firm-level) data. Certain indicators will be more useful than others for understanding the effectiveness of BEPS countermeasures.

66. ***Alternatives should be considered for summarising indicators***. A single indicator may provide information on both the level of BEPS and changes in BEPS over time. A ratio may be the most effective way to indicate the level, while trends or changes in time may be more effectively presented as an index with reference to an initial year value of the indicator.

67. ***Financial and tax flows should be related to economic activity***. The most useful indicators of the general scale of BEPS should link BEPS-related financial and tax flows to measures of real economic activity, such as GDP, sales, employment or the amount of capital used by firms. In other words, in constructing indicators to be used in evaluating BEPS, it is important to distinguish between shifts in profits among countries that reflect changes in real economic activity and BEPS-related transfers of profits that are not in response to changes in the location of real economic factors, labour and capital, that produce the income. It should be understood, however, that any indicator of BEPS, such as income relative to assets, sales, operating expenses or employment or any other economic measure will vary across countries for a number of reasons unrelated to BEPS. The economic sources of variation in profits relative to assets, for example, include differences in the ratio of capital to labour used in different businesses and locations, differences in market conditions, differences in profitability over the economic cycle, and differences in factor productivity.

68. ***Indicators should distinguish between BEPS and real economic effects of current-law corporate income tax features***. Indicators should focus on tax shifting due to BEPS, not real economic

responses to tax rate differences that reflect the impact of current-law provisions adopted by legislators, including incentives to expand business operations in their country. Legislated or discretionary tax incentives can have an important impact on reported corporate income tax payments that reflect the location of real economic activity. The challenge in developing indicators is distinguishing between the economic effects and BEPS. However, artificial cross-border arrangements to exploit legislated differences in tax structures, including statutory tax rate differences, are considered BEPS.

69. ***The initial BEPS indicators should be able to be refined with potential new data sources***. Initial indicators will be based on currently available data for a large number of countries. New methodologies and data sources will be identified going forward to analyse the scale of BEPS and the effectiveness of countermeasures to reduce BEPS. In some cases the initial indicators could be calculated from new data sources which could provide more targeted and accurate information for estimating BEPS.

70. ***Bad Indicators should be avoided; caveats should be highlighted***. Almost as important as developing effective indicators of BEPS is the need to avoid using poor, imprecise and misleading indicators. Indicators should have a high signal-to-noise ratio. In other words, indicators should provide a high ratio of information about BEPS behaviours relative to real economic effects and other non-BEPS factors. Any indicator will have limitations which should be highlighted. All indicators will require careful interpretation in analysing BEPS.

71. ***Indicators should be simple, clear and timely***. Indicators will be used by policymakers, so they should be simple, clear and well-described. However, their caveats and limitations should also be clearly noted. Where possible, indicators should not have significant time lags.

72. ***Indicators should be adaptable to extended uses.*** Initial indicators may focus on the global perspective, but some indicators should have the potential to be extended to be used by individual countries or for specific industries. The development of disaggregated indicators should be considered in the indicator development process.

Final Caution

73. One of the biggest challenges to developing and interpreting indicators is that BEPS "taints" available measures of corporate income tax bases, financial accounting statements, and even national aggregate measures of economic activity in the corporate sector. This is a serious limitation that is difficult to overcome with current data and methodologies available for measuring BEPS.

74. The data used to measure most of the indicators discussed in this paper unavoidably mix the influence of real economic activities, corporate income tax policies adopted to encourage business development, and BEPS.

75. It is important to note that each indicator provides a single perspective of the scale or composition of BEPS based on currently available data. The indicators are not equivalent to coefficients in regression equations used to measure the responsiveness of BEPS to corporate income tax rate differentials. A regression equation is designed to take into consideration or "control for" the simultaneous impacts of other economic variables on BEPS. However, in most cases, the indicators do provide high-level "controls" for some of the major non-BEPS factors through the use of ratios of tax variables to economic measures and differentials in tax measures between affiliates and their MNE worldwide group measures.

76. These limitations must be kept in mind in interpreting the information that each indicator or combination of indicators provides in helping portray the magnitude of BEPS and evaluating progress over

time in reducing BEPS. It may be the case that, in the future, new and better data sources may help overcome some of these data limitations.

List of Potential BEPS Action 11 Indicators

77. Potential BEPS Action 11 Indicators are described in this section. The discussion for each indicator includes a description, the rationale for the indicator and the data source that can be used to estimate the indicator. The Annex includes more detailed information on the calculations involved in producing each indicator. Also included are some example calculations for selected indicators, using samples of existing available data. The sample data used to produce these calculations are affected by the considerable limitations of existing available data sources outlined in detail in Chapter 1. As a result, the example calculations are designed to be illustrative rather than definitive, as the insights that can be discerned from these examples are greatly affected by the limitations of the existing available data. Each example also contains a statement of some of the important issues in estimating and interpreting the indicator.

78. This chapter proposes seven separate indicators that are presented in the following five categories:

A. Disconnect between financial and real economic activities

1. Concentration of high levels of net foreign direct investment (FDI) relative to GDP

B. Profit rate differentials within top (e.g. top 500) global MNEs

2. Differential profit rates compared to effective tax rates
3. Differential profit rates between low-tax locations and worldwide MNE operations

C. Domestic vs. foreign profit rate differentials

4. Differential profit rates between MNE group domestic and foreign operations
5. Differential effective tax rates between MNE affiliates and comparable domestic firms

D. Profit shifting through intangibles

6. Concentration of high levels of royalty payments received relative to R&D spending

E. Profit shifting through leverage

7. Interest expense to income ratios of MNE affiliates in high-tax locations

79. Indicators 1 and 6 are based on macro-level data on a country-by-country basis, while indicator 4 is calculated from MNEs' worldwide consolidated group accounting statements. Indicators 2, 3, 5 and 7 are calculated from MNE, firm-level financial information from the ORBIS database[17] for unconsolidated affiliates and/or worldwide consolidated groups.

General Structure of the Indicators

80. This section discusses general advantages, limitations, issues and possible extensions that apply generally to all the indicators discussed in this chapter. In addition, there are more specific comments about these dimensions in the introduction to the indicator categories. Finally, there are additional considerations that are discussed for specific indicators and in relation to the examples that are presented.

General advantages

81. Some of the advantages of using indicators include the following:

- Indicators can be calculated historically and on an annual basis to track the direction of changes in BEPS over time.
- Some indicators can be updated relatively quickly from data available on a timely basis.
- Indicators can be calculated in the future with more accurate, comprehensive data, while still tracking indicators using existing data.
- Indicators can be calculated, refined and extended by academic and other researchers to improve the indicators' ability to measure BEPS. This will contribute to the transparency of the process.
- Use of multiple indicators recognises that there is no single metric currently available to precisely measure the scale of BEPS and changes in BEPS over time. When multiple indicators provide similar results, there may be more substantial evidence of the presence of profit shifting.

General limitations

82. While there may be additional limitations that apply to a particular indicator, there are several important limitations that apply more broadly to all of the indicators. These limitations need to be included in any discussion of the indicator results.

- Non-tax economic factors are likely to explain a portion of the observed cross-country and over-time variations in the indicators of BEPS. For example, both firm-level and aggregate data will be influenced by the economic cycle, which may contribute to the variation of the indicators over time, independent of BEPS. *The indicators must be evaluated with this key limitation in mind*.
- There are important limitations related to the availability and quality of the reported data: missing affiliates in financial data, incomplete data, variation in how data is reported by country, changes in the way aggregate variables are measured over time (FDI, for example).

General extensions

83. There are common options for extending the indicator analysis that apply to all indicators:

- Indicators are designed so that they can be calculated with currently available data or with new data sources that become available in the future. As more accurate and disaggregated data becomes available, the ratio of signal-to-noise for individual indicators is likely to improve.
- One possibility for extension could be a combination of tax return information available to tax administrations with the publicly available financial information used in estimating the firm-level indicators. Tax administrations could use the combined information to estimate specific indicators and track the impact of BEPS countermeasures over time.
- In developing specific indicators, single global indicators could be extended to specific countries or industries (e.g., firm-level data could be analysed by major industry). This disaggregation, if permitted by the data, could help control for some of the variation in real economic factors.

84. The following five sections describe each of the seven potential indicators. The formulas underlying each of the indicator calculations are included in Annex 2.

A. Disconnect between Financial and Real Economic Activities

85. The indicator in this category uses macro (aggregate) data to develop an indirect indicator of BEPS using foreign direct investment (FDI) data.

86. FDI measures cross-border investments by a resident of one country (direct investor) in an enterprise (direct investment enterprise) in another country. Importantly, the investments being measured are those representing a "lasting interest" in the investment enterprise. The included investments are between affiliates with at least a 10% ownership link. In other words, FDI measures investments by related parties.

87. The indicator uses FDI stocks (positions) that represent the cumulative annual net investments of foreign direct investors in a country. In theory, the stock reflects all prior annual investments and disinvestments in a country. FDI stocks are reported separately for debt and equity direct investments.

Specific considerations for indicators of financial and economic disconnects

Strengths

- Indicator based on important global economic variables which include BEPS financial flows.
- Measures previously cited by many BEPS researchers.
- Can be easily explained.

Limitations

- FDI information includes financial stocks, as well as stocks related to real economic activities. The indicator has to be carefully evaluated in reaching conclusions about the presence of BEPS. In addition, not all BEPS behaviours might be captured by FDI statistics.
- Countries may be reporting transactions related to BEPS, such as transactions with special purpose entities, in different ways. This introduces cross-country variations in FDI based on reporting differences.

Issues

- FDI is measured relative to GDP. However, other real economic activity, such as trade flows (both imports and exports), and annual capital formation could be used in constructing the indicator.

<u>Indicator 1</u>: Indicator of concentration of foreign direct investment

Description: This macro-economic indicator is the ratio of the stock of net FDI (FDI stock owned by investors from OECD countries minus domestically-owned FDI stock in OECD countries) to a country's GDP, a measure of real economic activity. The indicator compares the FDI ratio in the 15 countries with the highest ratios to the net FDI ratio in the rest of the 198 included countries.

Rationale: FDI measures cross-border investments among related enterprises. The stock of FDI includes both BEPS and real economic activity. Abnormally high concentrations of FDI to GDP in a country or group of countries may provide an indication of BEPS.

Data source: *OECD Direct Investment Statistics.* The data is the inward and outward FDI stock from and to OECD countries. The FDI stock data is available for 213 countries identified in the OECD database.

Box 4. Example of Indicator 1: Concentration of net foreign direct investment to GDP

Background: FDI financial flows related to BEPS are expected to result in a relatively high ratio of FDI stocks to GDP.

Description: This indicator compares the average net FDI stocks per euro of GDP in the top 15 countries with the same ratio for the remaining 198 countries. A country's net FDI stock equals total inbound FDI stocks minus total outbound FDI stocks. The top 15 countries have ratios of at least 2.0.

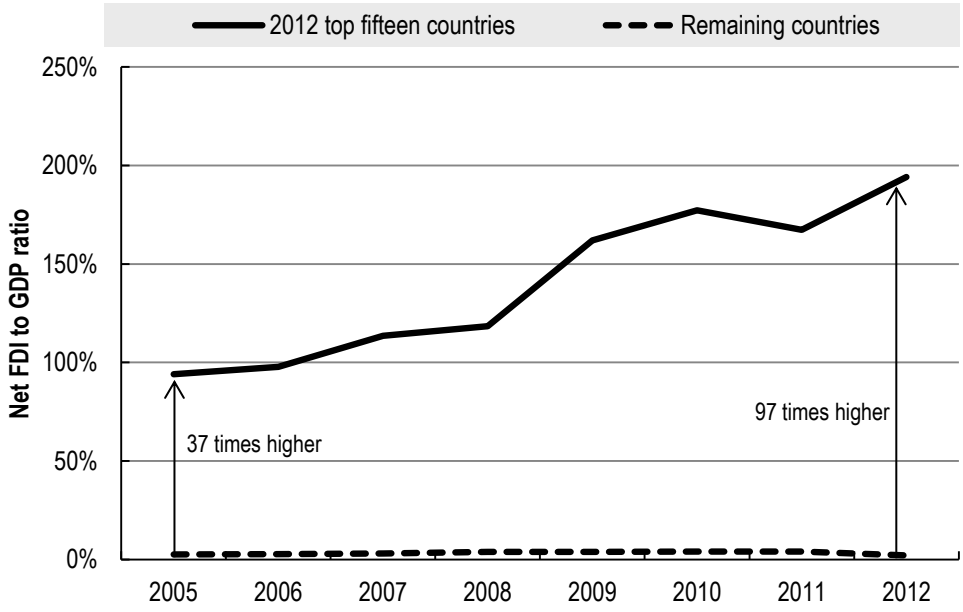
Data used: The net FDI stock variable is total inbound FDI into 226 countries (in 2012) from investors located in OECD countries. The source is OECD FDI Statistics 2014.

Results:

- The net FDI indicator more than doubled between 2005 and 2012.
- The 2012 value of the indicator shows that the amount of net FDI per euro of GDP in the top 15 countries was, on average, 96 times higher than the average ratio for the remaining 198 countries. The top 15 countries are mostly countries with no or low corporate income tax rates or preferential tax regimes.
- The indicator suggests a concentration of FDI in a select group of countries that is disproportionate to the real economic activity (as measured by GDP) in these countries.
- The top 15 countries in 2012 have an average net FDI stock that is 194% of the size of their GDP. In contrast, the average net FDI stock in the remaining countries averages only 2% of GDP.

Figure 2.1 shows the average (weighted by GDP) net FDI to GDP ratios for the top 15 countries and the remaining 211 countries. The values of the indicator are described for 2005 and 2012.

Figure 2.1: **FDI stock to GDP ratio, 2005-2012**



Note: *198 remaining countries
Source: OECD FDI Statistics 2014

Table 2.1 presents the values of Indicator 5 for 2005-2012.

Table 2.1: **Indicator 1, concentration of net FDI values, 2005-2012**

Year	Indicator 1
2005	36.8
2006	35.4
2007	36.4
2008	31.1
2009	41.0
2010	44.0
2011	42.1
2012	97.0

Caveats:

- Net FDI positions include both real investment and purely financial transactions, including mergers and acquisitions, unrelated to current economic activity. Only a portion of the financial transactions may be related to BEPS. The indicator cannot distinguish between BEPS and other transactions related to real economic activity, but a high indicator may flag potential BEPS.
- Other measures of FDI (gross FDI position, annual FDI flows and return on FDI) are potential alternatives, which show other dimensions. Flows and returns are more volatile year-to-year. Gross FDI includes in-bound FDI, withoutout offsets for out-bound FDI. Net in-bound FDI has the advantage of focusing on the final resting point of FDI, but offsets might cause a loss of BEPS information in case of pure conduit countries.
- The mixture of BEPS and real economic activity may vary between developing and developed countries. For example, developing countries with attractive investment climates may have relatively high FDI stock/GDP ratios. This needs to be taken into consideration in interpreting variations in the indicator across countries.
- Given the mixture of BEPS and real economic impacts on this indicator, this may be viewed more as a "secondary" indicator than a "primary" indicator. While the indicator may provide a global perspective, estimates for a single country should be used with caution.
- The indicator uses the same group of top 15 countries in each year of the calculation. Additional analysis is needed to determine how to select the top group.
- While the number of countries reporting FDI data has been fairly constant since 2005additional analysis is needed to determine how to treat changes in the composition of the 15 country group over time.
- The indicator can be refined as new information becomes available, such as the separate reporting of FDI for special purpose entities and mergers and acquisitions.

B. BEPS Indicators Based on Within MNE Profit Rate Differentials

Overview

88. The two indicators in this category are calculated using unconsolidated affiliate and consolidated worldwide group financial statement information. Each of the two indicators is constructed as a *relative* measure. For example, the indicators compare profits (i.e., pre-tax net income) to a measure of economic activity, such as a firm's assets (defined as "profit rates"), or profit rates for different groups of firms, for example, profit rates in lower-tax and higher-tax locations determined by effective tax rates (i.e., income tax expense divided by pre-tax income).[18]

89. The use of ratios of profit rates to measures of economic activity recognises that BEPS is characterised by a disconnect between where profit is reported and where the economic activity generating that profit occurs.

90. The denominator in the profit rate, the economic activity variable, could be measured by various inputs (e.g., assets, employment, labour compensation, operating expenditures) or a measure of output (e.g., sales). The indicators presented here use assets to measure economic activity. However, as the indicators are developed, different measures of economic activity can be tested, if data is available, to determine the variable for economic activity that provides the most reliable indicator.

Box 5. How should economic activity be defined?

There is no single best measure (conceptually or reported) from publicly-available firm data that summarises where the economic activity ("value added") of a firm occurs for use in the profit rate calculations. While value added by a company is the most comprehensive measure of the economic activity of a firm, it can only be calculated indirectly from data available from financial statements. In the public reports, all of the metrics are reported where the entity is incorporated, not where the assets and employment are located, or where the customers are located:

- *Assets* are most directly related to the use of capital that generates the net income subject to the corporate income tax. However, asset measures in financial statements generally tend to significantly understate the value of intangible assets, a major contributor to MNE worldwide income. Firm assets also exclude the value of public infrastructure and other government provided services which are part of a fully-specified production function. Assets include those financed by both equity and debt, while corporate income tax is generally on net equity income.

- *Employment* is directly related to labour costs, a second component of value added created by the capital and labour used by a firm. However, labour costs are subtracted in determining net income and are not in the taxable corporate net income base.

- *Sales* may be an indirect measure of the contribution of both labour and capital to value added, but it includes revenue paid to suppliers in addition to the income paid to capital and labour. Sales are the firm's total sales, but are not reported where the customers are located. It should also be noted that the value of sales can be distorted by BEPS through transfer pricing.

- *Operating expenditures* may be a useful measure of economic functions in some cases such as service industries. The value may be distorted by BEPS through transfer pricing.

91. The indicators in this category differ primarily in the groups of firms used to compare profit rates. The different groups used in the two indicators are: 1) MNE affiliates in higher-tax and lower-tax countries, and 2) combined affiliates in lower-tax countries vs. the MNE's worldwide operations. For each indicator, tax variables are used to either identify groups or to compare profit rates directly to effective tax rates (ETRs) in the calculation of the indicators.

Specific considerations for profit rate indicators

Strengths

- Indicators use backward-looking financial ETRs, not statutory rates.
- Firm-level data can be used to help control for non-BEPS influences that are specific to an unconsolidated affiliate or entity, although non-tax factors will still affect the indicator.
- Using both MNE group and affiliate-level data in calculating an indicator holds many of the MNE-specific, non-tax factors constant, which may assist in segregating BEPS effects from real economic effects.
- Based on the theory of profit shifting driven by tax rate differentials across locations, this construct is similar to the approach used in academic studies of income shifting opportunities.

Limitations

- Measures are dependent on available financial reporting data, so may not have information for all affiliates and may have limited geographic coverage. Financial statement data is primarily limited to public corporations, not privately-held corporations or partnerships.
- The profit rate is calculated based only on assets, and is not adjusted for functions and risks.
- The calculations of profit rates require information on tax expense, pre-tax income and assets. The availability of this information may vary for MNE affiliates within a single country, as well as across countries due to variations in reporting requirements.
- Information on the economic factors may have data issues (e.g., most intangibles are not in total assets).
- The tax variable (average effective tax rates) is calculated from reported financial statement income tax expense (current tax expense plus deferred tax expense), not actual taxes paid or tax liability on current-year income.
- These indicators provide only indirect evidence of BEPS. Reported tax expense (or actual taxes paid, if available) already includes the effects of BEPS and non-BEPS, resulting in lower reported taxes in higher-tax countries and higher reported taxes in lower-tax countries. The net reduction in worldwide taxes of MNEs, either from shifting income among countries with different tax rates or from the net reduction of reported worldwide taxable income, is not directly measured in the indicator.
- Publicly-available information is based on accounting data, not tax variables, and may not have the measure of economic activity that is of interest in constructing an indicator (e.g., country of incorporation may not be the country of tax residence).

Issues

- Averages may obscure the behaviour of a subset of companies that are undertaking BEPS. Where available, the distribution of the indicator values could be examined for the influence of significant "outliers."

Possible extensions

- Where available, substitute tax-return data compiled by tax administrations for firm-level financial statement data.
- Expand to a larger list of top corporations over time.
- Possibly include a random sample of smaller companies from similar sectors. This could provide additional insights into differences in BEPS behaviour by size of firms.
- Consider indicators, if data is available, disaggregated by country or industry.
- Conditional on data availability, alternative measures of economic activity, such as labour compensation, employees, operating expenditures or sales could be used in calculating profit rates.

The following sections describe the two indicators in detail.

Indicator 2: High profit rates of low-taxed affiliates of top global MNEs

Description: This indicator shows the percentage of income earned by affiliates in lower-tax countries with higher profit rates, by comparing the profit rate (i.e., profits/assets) to the ETR (i.e., tax expense/profit) of MNE affiliates for top global MNEs.

For each affiliate, a differential profit rate is compared to the affiliate's differential ETR. The profit rate differential is the difference between the affiliate's profit rate and its MNE group worldwide profit rate; the ETR differential is the difference between the affiliate's ETR and its MNE group worldwide ETR.

When BEPS occurs, it is expected that the profit rate differential in lower-tax affiliates will be positive. In other words, profit rates of the affiliates will exceed the worldwide profit rate of the MNE. In terms of ETRs, it is expected that the ETR differential will be negative, where BEPS is occurring, because the affiliate's ETR will be less than the MNE's worldwide ETR.

Rationale: This indicator uses affiliate-level data to estimate what percentage of the total pre-tax income reported in the sample is reported by lower-tax, higher-profit affiliates. "Lower-tax" affiliates are affiliates with ETRs that are less than the MNE group's ETR and "higher-profit" affiliates have profit rates that exceed the worldwide MNE group's profit rates. Indicator 2 focuses on the percentage of total reported income being earned by those lower-tax, higher-profit affiliates.

Data source: Unconsolidated affiliate and worldwide consolidated group financial statement information for the top 250 global MNEs reporting information is needed to calculate the indicator.

Box 6. Example of Indicator 2: High profit rates of low-taxed affiliates

Background: BEPS involves shifting profits from affiliates in high-tax countries to affiliates in low-tax countries.

Description: This indicator summarises the relationship between the profitability of MNE affiliates in a country and their ETRs. The indicator is equal to the share of total pre-tax income in the sample reported by affiliates in higher-profit, lower-tax countries. In Figure 2.2, the affiliates that are in the lower-tax, higher-profit category and are represented by the shaded area in the southeast quadrant of the graph.

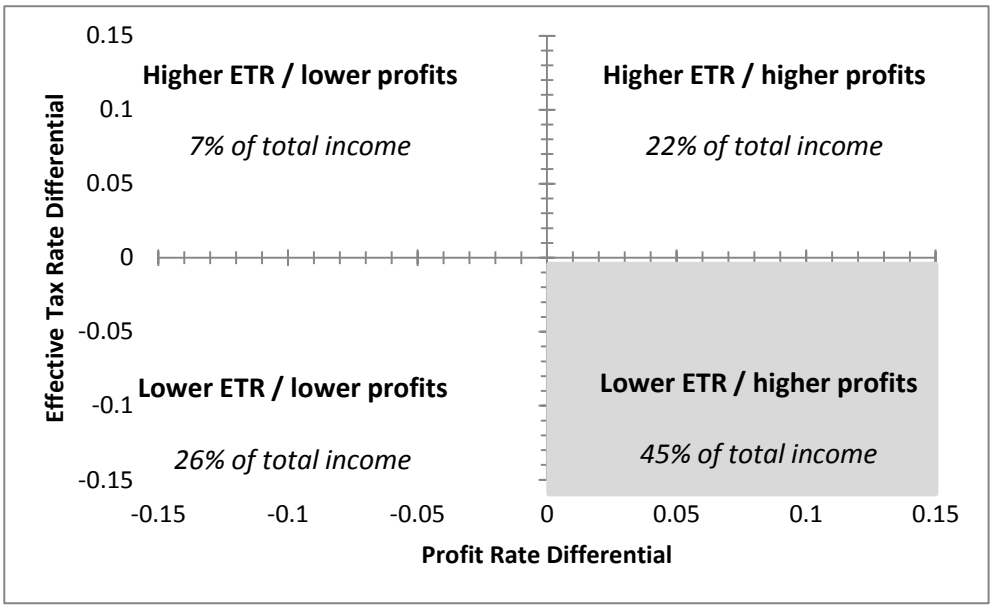
Data used: The calculation uses financial information on tax expense, pre-tax profits, and assets from financial reports for 250 of the top global MNEs (by sales) and their affiliates. The calculations are done for over 2,300 country-level affiliate groups that include over 10,000 affiliates. Financial groups are not included.

Results:

- In 2011, lower-tax, higher-profit affiliates accounted for 45% of the total income reported by all affiliates in the sample. This is the value of the indicator. These affiliates accounted for 33% of total affiliates.
- The affiliate groups in the northwest quadrant, higher ETRs and lower profit rates, accounted for only 7% of the total income. If BEPS is occurring, a portion of the income in this quadrant and in the northeast quadrant may have been shifted to the southeast quadrant (lower-tax, higher-profit affiliates).
- The value of the indicator increased by 32% between 2007 and 2011.

Figure 2.2 explains the indicator in terms of the four quadrants in the diagram. The lower-right quadrant is the area indicating potential BEPS. This is the quadrant that includes affiliate groups with lower ETRs and higher profits, relative to the worldwide MNE measures. The figure also identifies the percentage of total affiliate pre-tax income reported in each quadrant. For example, affiliate groups in the southeast quadrant account for 45% of the total income in 2011.

Figure 2.2: **Illustration of Indicator 2, high profit rates of low-taxed affiliates**



***Caveats**:*

- While the indicator partially controls for differences in the profitability of affiliates, by comparing them to their MNE's worldwide profitability, it cannot differentiate between higher profit rates due to BEPS and higher profit rates possibly needed to ensure competitive after-tax rates of return on investments.
- The indicator does not control for or hold constant other factors that influence BEPS, including variation in affiliate characteristics, such as size and industry.

<u>Indicator 3</u>: High profit rates of MNE affiliates in low-tax locations

Description: For the top global MNEs, this indicator compares the profit rate (i.e., profits/assets) of MNE affiliates in low-tax rate locations (countries) with the MNE's worldwide profit rate. Low-tax countries are defined as countries with the lowest affiliate ETRs, accounting for 20% of the MNE group's worldwide assets.[19]

Rationale: This indicator uses both group and firm-level financial data of the largest global MNEs to show the extent to which reported profits differ between low-tax rate locations and the profit rate of the worldwide group.

An index number above one shows that affiliates in low-tax rate countries have higher reported profit rates than the worldwide rate for their MNE group, which could be an indication that profit shifting into low-tax rate locations is occurring. A higher number is a stronger indication.

Data source: Global financial statement report information of MNEs and their affiliates. Databases of top public corporations (e.g., top 250 or 500 global MNEs) for which financial data are available for the affiliates, can be used to calculate the indicator.

Box 7. Example of Indicator 3: High profit rates of MNE affiliates in lower-tax locations

Background: The presence of BEPS is expected to result in relatively high profit rates in relatively low-tax locations. Indicator 3 defines relatively low-tax locations in terms of the country-by-country distribution of a MNE group's worldwide assets.

Description: This indicator compares the profitability of a MNE's affiliates in lower-tax countries to the profitability of the MNE's worldwide operations. Affiliates' ETRs (weighted by assets) are calculated for each country where a MNE has affiliates; countries are ranked by ETR for each MNE. Profit rates are calculated for lower-tax locations, defined as countries with the lowest ETRs that account for 20% of the MNE group's worldwide assets. The relative profitability of a MNE's affiliates in lower-tax countries is the profit rate in these countries divided by the MNE's worldwide profit rate. The indicator is the weighted (by assets) average profit rate ratio over all MNEs in the sample.

Data used: The calculation uses financial information on tax expense, pre-tax profits, and assets from financial reports for 250 of the top global MNEs and their affiliates. The calculations are done for over 170 MNE groups and their 10,000 affiliates.

Results:

- In 2011 profit rates of affiliates in lower-tax countries of 171 of the largest MNEs were on average almost twice as high as their worldwide MNE group's profit rates (ratio of 2.0).
- For the same year, the top 25% of the MNEs, ranked by relative profit rates, had ratios exceeding 2.4; the ratio exceeded 4.4 for the top 10% of the MNEs.
- The indicator increased by 3% between 2007 and 2011.

Table 2.2 summarises descriptive statistics for 2007 and 2011.

Table 2.2: **Example of Indicator 3: high profit rates of MNE affiliates in lower-tax locations**

	2007	**2011**
Indicator 3	**1.9**	**2.0**
Highest 25% have ratios above	1.9	2.4
Highest 10% have ratios above	3.2	4.4

Caveats:

- Relatively high profit rates in lower-tax countries may reflect differences in real economic activity for affiliates in lower-tax countries relative to the MNEs' worldwide operations, but a significantly higher profit rate in lower-tax countries is a potential indication of BEPS.
- There are MNEs in the database that may have relatively low indicator values because of missing affiliates with relatively high profit rates. In these cases, the potential for BEPS may be understated.

C. Domestic vs. Foreign Profit Rate Differentials

Overview

92. The two indicators in this category compare domestic and foreign profit rate differentials to backward-looking effective tax rates (ETRs) for domestic and foreign firms. Indicator 4 uses worldwide consolidated financial statement data and Indicator 5 uses affiliate-level unconsolidated financial statement data.

Indicator 4: Profit rates compared to effective tax rates for MNE domestic and foreign operations

Description: For the top global MNEs, this indicator compares the profit rate (i.e., profits/assets) differential between the MNE's domestic and foreign operations to the MNE's ETR (i.e., tax

expense/profits) differential between domestic and foreign operations.[20] The differentials are measured as the difference between the domestic and foreign values; both differentials can be positive or negative.

The indicator is the correlation coefficient between the MNE domestic/foreign profit rate differentials and the domestic/foreign ETR differentials.

Rationale: This indicator uses worldwide consolidated financial statement information for both domestic and foreign operations of the top global MNEs. It shows the extent to which the reported profitability of domestic operations is less than the profitability of the MNE's foreign operations in countries where the ETR on domestic operations is higher than the ETR on foreign operations. A negative correlation between the profit rates and ETRs is an indication of BEPS.

Data source: The profit rates and ETRs are calculated from MNE worldwide consolidated financial data, where domestic and foreign operations are reported separately, for the top global MNEs. Consolidated worldwide data eliminates double counting of net income among affiliates and includes total worldwide profits and taxes.

Box 8. Example of Indicator 4: Profit rates relative to ETRs, MNE domestic vs. global operations

Background: BEPS results in profits being shifted from higher-tax to lower-tax countries. BEPS can involve the shifting of profits from a MNE parent's country if the domestic ETR is higher than the foreign ETR. A negative correlation between the domestic and foreign measures of profitability and ETRs is an indication of BEPS.

Description: This indicator examines the relationship between the profit rate and ETR differentials for the domestic and foreign operations for the top global MNEs.

Data used: The indicator value was estimated for the years 2007 to 2009 using consolidated financial statements. The illustrative calculations are estimated for the nine MNEs (out of 25 examined in detail) that had the needed financial information to separately identify a MNE's domestic and foreign operations.

Results:

- Higher ETR differentials are associated with lower profit rate differentials, which may reflect that profits are shifted out of countries where MNE domestic operations face relatively high ETRs.
- There is a negative correlation between the domestic and foreign measures of profitability and ETRs of companies in the sample for each of the years calculated. Such a negative correlation is an indication of BEPS.
- The correlation coefficient between the profit and ETR differentials varies in value from -0.25 to -0.59.

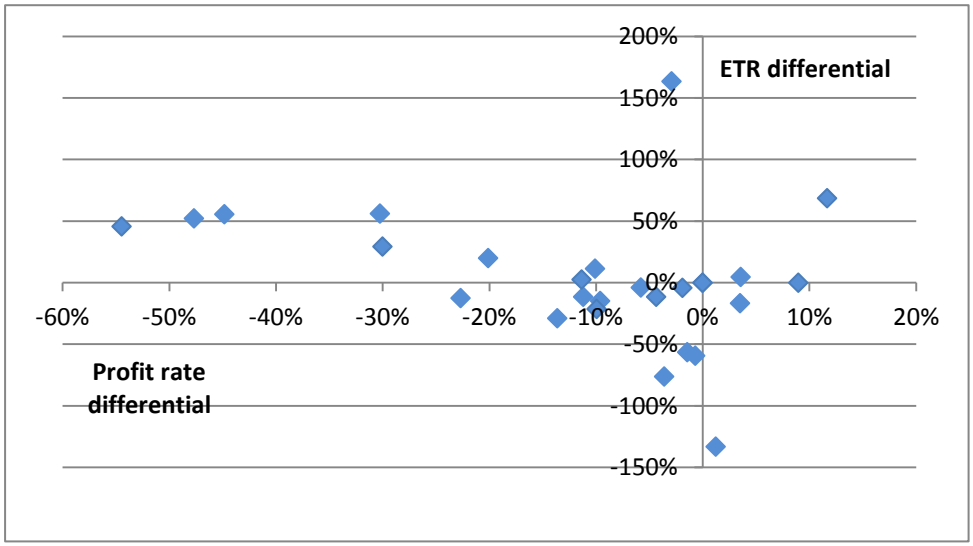
Table 2.3 presents illustrative values for Indicator 4.

Table 2.3: **Indicator 4 values, 2007-2009**

Year	Value of Indicator 4
2007	-0.25
2008	-0.59
2009	-0.38

Figure 2.3 plots the values for the profit rate differentials on the horizontal axis and the ETR differentials on the vertical axis for all three years. To the right of the zero point (the origin) along the X axis, the profit rate of the MNE's domestic operations is larger than the profit rate of the MNE's foreign operations and the differential is positive. To the left along the X axis, the domestic profit rate is less than the foreign profit rate and the differential is negative. In the positive range of the Y axis, the ETR of the domestic operations exceeds the ETR of the foreign operations, and the differential is positive. In the negative range of the Y axis, the domestic ETR is less than the foreign ETR and the differential is negative. In the presence of BEPS, these two differentials would have opposite signs. While the negative relationship between the differentials is evident in the plot, it also shows the wide variation in differentials in the sample.

Figure 2.3: **Plot of differential (domestic minus foreign) profit rates and ETRs for selected MNEs, 2007 – 2009**



Caveats:

- This indicator requires worldwide financial reporting data for both domestic and foreign MNE operations. Publicly available MNE financial reports vary significantly in how, and if, the worldwide information is reported separately for domestic and foreign operations. This somewhat limits the number of MNEs that can be included in this indicator using currently available financial reports.
- As is the case for each of the indicators estimated using MNE and affiliate financial reporting data, total tax expense data used to estimate this indicator can differ substantially from the taxes actually paid. (See discussion in Chapter 1.)
- The profitability of domestic and foreign operations will vary by the composition of activities that may involve different degrees and types of capital and labour intensity.
- The correlation coefficient only captures the strength of the relationship between ETR and profit rate differentials. It is not an estimate of the slope of the relationship in a regression equation.

Indicator 5: Effective tax rates of MNEs compared to comparable domestic firms

Description: This indicator compares the ETRs of affiliates of top global MNEs in a country with matched, comparable domestic-only firms in the same country.

This indicator is calculated using a database of public corporations that includes financial data for both MNE affiliates and domestic-only firms. "Comparable" firms are defined as firms with similar country, industry, size, and other firm-specific characteristics. The comparables are identified by a propensity score or regression methodology designed to match similar MNE affiliates and domestic-only firms.[21]

For a representative sample of comparably matched firms, ETRs are calculated for each included firm. The indicator compares the ETR of a foreign affiliate to the ETR of the matched domestic-only firm. A value below one is a possible indication of BEPS operating through hybrids and possibly other BEPS channels that create a mismatch between financial income and taxable income. It will show whether MNE affiliates, that may have greater opportunities for BEPS, have a lower ETR, estimated from financial information, than comparable domestic-only firms.

Rationale: This indicator uses unconsolidated data to measure whether MNE affiliates have lower ETRs than the ETRs of 100% domestic companies. To the extent that this indicator shows lower ETRs for MNE affiliates relative to domestic-only firms, it would provide insight into a possible competitive disadvantage for domestic firms due to BEPS.

Data source: MNE affiliate and domestic-only unconsolidated financial statement information is used to calculate the indicator.

Box 9. Indicator 5: Effective tax rates of MNE affiliates compared to comparable domestic firms

Example: Illustrative calculations for this indicator have not been made. While unconsolidated financial statement information used in several other indicators is the beginning point for the calculation of this indicator, the database has to be expanded to include domestic-only firms, not just affiliates of MNEs.

Caveats:

- Lower ETRs of comparable MNE affiliates may be due to legislated or negotiated tax preferences or real economic differences that are not being held constant in the matching process. In this case, the indicator mixes BEPS with these other factors.
- Many affiliates of top global MNEs may not be able to be strongly matched to a domestic comparable due to unique characteristics of MNE affiliates (i.e., global business networking, more significant economies of scale, or ownership of intangibles). Given the particular characteristics of MNEs, it may not be possible to find comparable domestic firms for every affiliate of the top global MNEs.
- The matching procedure is an important step in developing this indicator. For this reason, the matching procedure will be more fully described in the final indicator analysis.

D. Profit Shifting Through Intangibles

93. The indicator in this category provides an indirect measure of BEPS related to intangible property. The indicator is based on macro-data on royalty payments.

Indicator 6: Concentration of royalty payments relative to R&D expenditures

Description: This indicator combines balance of payments information on royalty payments received by a country and information on the country's current R&D expenditures.[22] The indicator compares the average ratio of royalties received to R&D expenditures for the five countries with the highest ratio to the same ratio for the other countries in the sample.

Rationale: Transferring intellectual property from a higher-tax country where R&D takes place to a lower-tax country is one channel facilitating BEPS, and occurs through cross-border royalty payments to the low tax jurisdiction. The size of these royalty inflows relative to current R&D expenditures may indicate BEPS. A high value of the indicator suggests that the income stream from intellectual property received in the top five countries is significantly higher, relative to other countries, than would be expected given the actual R&D expenditures in these countries.

Data source: Balance of payments and R&D expenditures from the World Bank, *World Development Indicators*.

Box 10. Example of Indicator 6: Royalties received compared to R&D spending

Background: The transfer of intellectual property (IP) from high-tax countries where it is developed to low-tax countries after development may facilitate BEPS. It results in lower royalty receipts per euro of R&D spending in the country where the IP was developed and higher receipts per euro of R&D spending in the country to which the IP was transferred.

Description: This indicator compares royalties received to R&D spending in the five countries with the highest ratios to the average ratio in the remaining countries. Abnormally high royalty/R&D spending values may indicate BEPS.

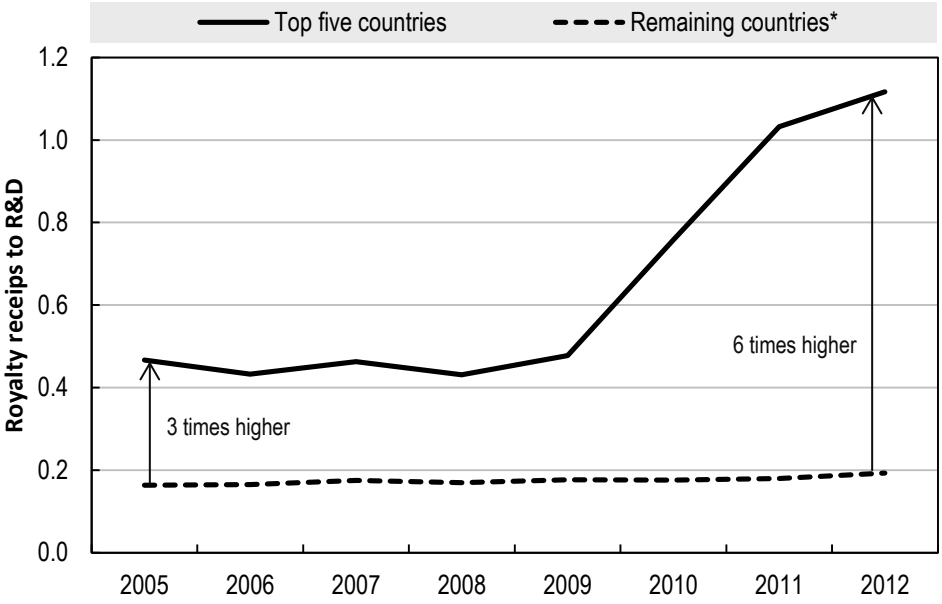
Data used: Balance of payments and R&D expenditures from the World Bank, *World Development Indicators.*

Results:

- In 2011, the top five countries received 1.12 euros per euro of R&D spending. The remaining countries received only 0.19 euros per euro of R&D spending.
- As a result, the royalties/R&D spending ratio for the top five countries was 600% of the same figure for the remaining 54 countries included in the sample.
- The indicator value doubled between 2005 and 2012.

Figure 2.4 provides illustrative calculations for Indicator 6 over the 2005-2012 period. The diagram compares the values of the royalties to R&D spending ratios for the top five countries and the remaining 54 countries for which data is available.

Figure 2.4: **Illustration of Indicator 6, ratio of royalties to R&D expenditure, top five countries relative to other countries, 2005-2012**



Note: The remaining countries group includes 54 other countries.
Source: World Bank, *World Development Indicators*.

Table 2.3 lists the estimated annual indicator values.

Table 2.4: **Estimated annual indicator values**

Year	Indicator 6
2005	2.9
2006	2.6
2007	2.6
2008	2.5
2009	2.7
2010	4.3
2011	5.8
2012	5.8

Caveats:

- The number of countries with data available to calculate this indicator varied significantly over the eight-year period, ranging from 32 to 69. Differences across time may be partly due to the changing composition of countries. As a more consistent time series of data becomes available, the signal-to-noise ratio may improve. Alternatively, the time series could be adjusted for changes in coverage.
- A limitation of this indicator is that current income from intellectual property could be the result of R&D expenditures in prior years. The indicator currently does not include any adjustment for this time lag.
- Although this indicator cannot directly distinguish between BEPS and real economic activity, the very high ratios of royalties received to R&D spending in a handful of countries is a potential indication of BEPS.

E. Profit Shifting Through Interest

The indicator in this category looks at the use of interest payments on debt of MNEs and their affiliates that may be a source of BEPS.

Indicator 7: **Interest expense to income ratios of MNE affiliates in countries with above average statutory tax rates**

Description: This indicator shows the above-average interest to income ratio by MNE affiliates with relatively high interest-to-income ratios located in higher-tax countries. The interest-to-income ratio is defined as interest paid divided by EBITDA.[23]

Interest to income ratio differentials are calculated for each affiliate of the top 250 global MNEs. The interest ratio differential is the difference between an affiliate's interest-to-income ratio (which includes both third-party and related-party interest) and its MNE group's worldwide consolidated interest-to-income ratio. Higher-tax countries are defined as countries with combined national and subnational statutory tax rates (STRs) above the average (weighed by EBITDA) for all included MNE affiliates.

When BEPS occurs through interest deductions, it is expected that the interest-to-income ratio differential in countries with STRs above the average will be positive. In other words, the ratio of interest-to-income of the affiliates will exceed the worldwide MNE group's interest-to-income ratio.

Rationale: This indicator uses affiliate-level and consolidated financial reporting data to estimate what percentage of the total gross interest paid by affiliates in the sample is reported by affiliates with positive interest-to-income ratio differentials located in countries with STRs greater than the average STR. Affiliates with relatively high interest-to-income ratios have combined external and internal interest paid to income ratios that exceed the same ratio (with external interest paid only) for the worldwide MNE group. With BEPS, a large share of total interest paid is expected to be reported by affiliates with interest to income ratios above their worldwide group's ratio and located in countries with STRs above the weighted average.

Data source: Unconsolidated affiliate and consolidated MNE group financial statement information was used to estimate the indicator, where information was available.

Box 11. Example of Indicator 7: Interest-to-income ratios of MNE affiliates in locations with above average statutory tax rates

Background: The presence of above-average interest-to-income ratios of affiliates located in countries with statutory tax rates (STRs) above the weighted average indicates BEPS through excess interest deductions that shift income from higher-tax to lower-tax countries.

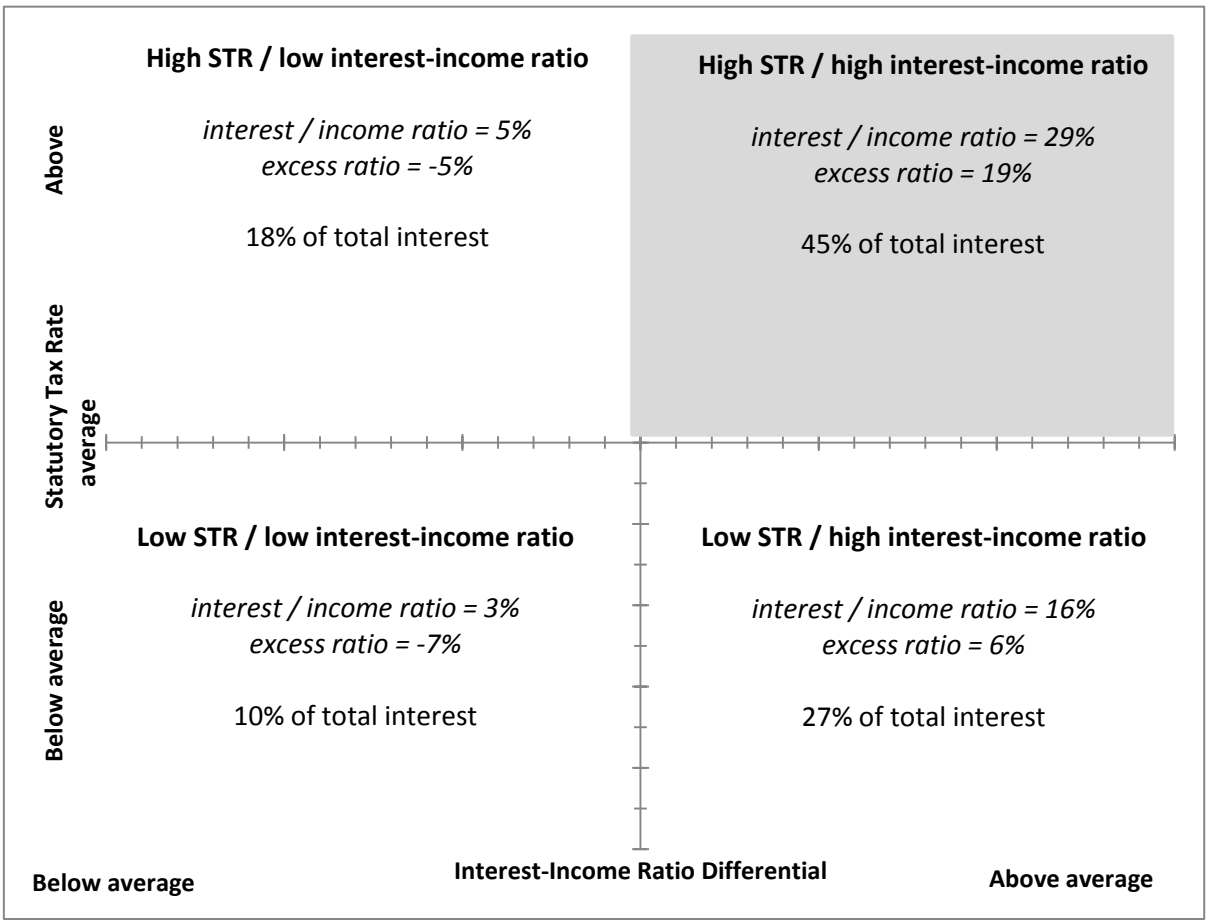
Description: This indicator measures the excess interest-to-income ratio reported by MNE affiliates with relatively high interest-to-income ratios located in countries with STRs above the weighted average.

Data used: The indicator value was estimated using affiliate-level and consolidated financial information on interest paid and EBITDA for just over 10,000 affiliates of the top 250 global MNEs. The STRs of the affiliates are from OECD information on national plus subnational statutory corporate income tax rates.

Results:

- For the affiliates with high interest-to-income ratios in higher tax rate countries, the interest-to-income ratio was 29% in 2011. In other words, interest expense accounted for 29% of their pre-tax income before interest, depreciation and amortisation expenses. This ratio exceeds the average interest-to-income ratio of (10%) for all of those affiliates by 19 percentage points, the value of the indicator. The affiliates are represented in the shaded, northeast quadrant of Figure 2.5.
- 45% of the total interest expense of all affiliates in the sample in 2011 was from affiliates with interest-to-income ratios in excess of their MNE's worldwide consolidated ratio, and located in countries with STRs above the average.

Figure 2.5: **Example of Indicator 7, interest-to-income ratios of MNE affiliates in higher-tax locations**



Caveats:

- The indicator is calculated using gross interest expense as reported in financial statements. If additional data becomes available, net interest expense could be used in the calculation. Financial firms are not included in the calculation of this indicator.
- The interest expense to income leverage ratio is designed to measure one channel of BEPS, the use of excess interest expense deductions to shift profits from higher-tax to lower-tax locations. It is not an indicator of other BEPS behaviours.
- The indicator focuses on affiliates' related-party and third-party interest expense relative to their groups' third party interest expense. It does not control for the general corporate tax issue of the double taxation of corporate equity and the deductibility of interest expense.

Indicators considered but not included

94. A number of additional indicators were examined but not included in the indicator dashboard. In addition, there were suggestions for possible indicators that could not be estimated due to the lack of currently available data. Examples of indicators that were considered but not included are:

- Profit rate differentials for global MNEs, high-tax vs. low-tax locations.
- Forward-looking average effective tax rates for representative taxpayers based on financial characteristics of corporate income tax filers. It was not clear how impacts of BEPS on the representative taxpayers could be aggregated to derive an indicator metric.
- Forward-looking average or marginal effective tax rates for hypothetical taxpayers on new investments.
- Concentration of high levels of FDI flows relative to real GDP (inflow of FDI owned by OECD foreign investors into a country/the country's GDP).
- Concentration of high levels of royalty payments (royalty payments received/GDP in receiving country).
- Concentration of FDI leverage.
- Concentration of high levels of patents developed outside of country (patents owned by residents of a country that have been invented in another country/total patents filed in the country).
- Concentration of FDI related to special purpose entities (SPEs) relative to GDP in a receiving country, due to lack of available data.
- Tax gap measures based on the comparison of national income account corporate data and reported taxable corporate income taxes. This measure is currently only available for several countries and includes the impact of significant non-BEPS factors.
- BEPS estimates based on extrapolations of current-law tax audit assessments using a definition of no or low-tax rate countries based on statutory corporate income tax rates.

95. The main reasons these indicators were not included were problems with the data that was available and/or difficulty in distinguishing between real economic effects and BEPS.

Questions for Consultation

96. Feedback on the following specific questions would be helpful in constructing, describing, and evaluating the BEPS indicators.

- For indicators that use a specific group of countries (e.g., top 15 countries) or different groups of firms (e.g., global top 250 companies), how should changes over time in the composition of the groups be handled? While maintaining the same composition over time ensures year-by-year comparability, annual changes in the composition would result in a more representative measure of the current value of an indicator.
- How could information about the distribution of observations used in calculating an indicator be provided as part of any analysis?
- How should the results be reported? Depending upon data availability, the indicator values may be reported globally, by country, by industry or other categories.
- Should any of the included indicators be dropped? What additional potential indicators could be included?
- The indicators based on consolidated and unconsolidated tax and financial data have been calculated using the data as reported. This includes, in some cases, using negative values for reported net income and tax expense. It also means that "outliers" are being used in the calculations.
    - Is this a reasonable approach in dealing with the limitations of reported data?
    - Are there suggestions on systematic ways to deal with extreme outliers?
    - Should affiliates reporting financial statement losses be included or excluded? If included, how should negative values be handled?
- Will the suggested set of indicators when considered together provide sufficient information for a strong indication of BEPS? If not, what indicators should be added or modified?

Annex 2

FORMULAS FOR CALCULATING INDICATORS

Indicator 1: Concentration of net foreign direct investment (FDI)

1. Year 2012 was chosen as a base year for Indicator 1. OECD FDI Statistics was the source of data on FDI.

2. An inward FDI position of partner country *i* (iFDI_i) is calculated as the sum of outward FDI positions from all available OECD countries to partner country *i* in 2012, as shown in the following equation, where $oFDIp_{i,j}$ is outward FDI position reported by OECD country *j* to partner country *i* and *N* is the number of OECD countries. If the partner country is an OECD country, only FDI positions from the other 33 OECD countries are taken into account.

$$iFDI_i = \sum_{j=1}^{N} oFDIp_{i,j}$$

3. An outward FDI position of partner country *i* (oFDI_i) is calculated as the sum of inward FDI positions of all available OECD countries from partner country *i* in 2012, as shown in the following equation, where $iFDIp_{i,j}$ is inward FDI position reported by OECD country *j* from partner country *i* and *N* is the number of OECD countries.

$$oFDI_i = \sum_{j=1}^{N} iFDIp_{i,j}$$

4. A net FDI position of partner country *i* (*net* FDI_i) is calculated as the difference between the inward FDI position and outward FDI position.

$$net\ FDI_i = iFDI_i - oFDI_i$$

5. The net FDI to GDP ratio is calculated for each partner country *i*.

$$net\ FDI\ to\ GDP\ ratio_i = \frac{net\ FDI_i}{GDP_i}$$

6. Partner countries are ranked by their net FDI to GDP ratios. The 15 countries with the highest net FDI to GDP ratios are selected and the weighted average net FDI to GDP ratio for those 15 countries (*net FDI to GDP* $ratio_{top15}$) is calculated. The weighted average net FDI to GDP ratio for the remaining partner countries (*net FDI to GDP* $ratio_{rest}$) is calculated where *n* is the total number of partner countries reported by OECD countries.

$$net\ FDI\ to\ GDP\ ratio_{top15} = \frac{\sum_{i=1}^{15} net\ FDI_i}{\sum_{i=1}^{15} GDP_i}$$

$$net\ FDI\ to\ GDP\ ratio_{rest} = \frac{\sum_{i=16}^{n} net\ FDI_i}{\sum_{i=16}^{n} GDP_i}$$

7. The indicator for 2012 is calculated as the ratio of net FDI to GDP ratio of the top 15 countries to the ratio of net FDI to GDP ratio of the remaining countries.

$$Indicator = \frac{net\ FDI\ to\ GDP\ ratio_{top15}}{net\ FDI\ to\ GDP\ ratio_{rest}}$$

8. Steps 2 to 5 are repeated for other years with the same top 15 countries identified in 2012 even if the countries are not the countries with the highest net FDI to GDP ratios in the other years.

Indicator 2: High profit rates of low-taxed affiliates of top global MNEs

A. For all affiliates of MNE 1 and a given year, profit rate differentials are calculated as follows.

1. For affiliate *i*, the profit rate (*profit rate*$_{i,MNE1}$) is calculated as pre-tax income of affiliate *i* divided by assets of affiliate *i*.

$$profit\ rate_{i,MNE1} = \frac{pre\text{-}tax\ income_{i,MNE1}}{assets_{i,MNE1}}$$

2. The global profit rate for MNE 1 (*profit rate*$_{g,MNE1}$) is calculated as MNE's consolidated pre-tax income divided by MNE's consolidated assets.

$$profit\ rate_{g,MNE1} = \frac{pre\text{-}tax\ \ income_{g,MNE1}}{assets_{g,MNE1}}$$

3. The profit rate differential of affiliate *i* (*profit rate diff*$_{i,MNE1}$) is calculated as the difference between the affiliate *i*'s profit rate and MNE 1's global profit rate.

$$profit\ rate\ diff_{i,MNE1} = profit\ rate_{i,MNE1} - profit\ rate_{g,MNE1}$$

B. For all affiliates of MNE 1 and the given year, effective tax rate differentials are calculated as follows.

1. For affiliate *i*, the effective tax rate ($ETR_{i,MNE1}$) is calculated as affiliate *i*'s tax expense divided by affiliates *i*'s pre-tax income.

$$ETR_{i,MNE1} = \frac{tax\ expense_{i,MNE1}}{pre\text{-}tax\ income_{i,MNE1}}$$

2. The global effective tax rate for MNE 1 ($ETR_{g,MNE1}$) is calculated as MNE 1's consolidated tax expense divided by MNE 1's consolidated pre-tax income.

$$ETR_{g,MNE1} = \frac{tax\ expense_{g,MNE1}}{pre\text{-}tax\ income_{g,MNE1}}$$

3. The effective rate differential of affiliate *i* (*ETR diff*$_{i,MNE1}$) is calculated as the difference between the affiliate *i*'s ETR and MNE 1's global ETR.

$$ETR\ diff_{i,MNE1} = ETR_{i,MNE1} - ETR_{g,MNE1}$$

C Steps A and B are repeated for all MNEs in the sample.

D. Affiliates with profit rates differentials greater than zero and ETR differentials less than zero are selected.

E. The indicator for the given year is calculated as the sum of pre-tax income of affiliates selected in step D divided by the sum of pre-tax income of all affiliates where *k* is the number of all MNEs in the sample, n_i is the number of affiliates of MNE *i* and m_i is the number of affiliates of MNE *i* selected in step D.

$$Indicator = \frac{\sum_{i=1}^{k}\sum_{j=1}^{m_i} pre\text{-}tax\ income_{j,MNEi}}{\sum_{i=1}^{k}\sum_{j=1}^{n_i} pre\text{-}tax\ income_{j,MNEi}}$$

Indicator 3: High profit rates of MNE affiliates in low-tax locations

A. For MNE 1 and a given year, the profit rate differential is calculated as follows.

1. For country *i* where MNE 1 has affiliates, the sum of assets ($assets_{i,MNE1}$), the sum of pre-tax income ($pre\text{-}tax\ income_{i,MNE1}$), and the sum of tax expenses ($tax\ expense_{i,MNE1}$) of all MNE 1's affiliates in country *i* are calculated where $assets_{j,i,MNE1}$ is assets of MNE 1's affiliate *j* in country *i* (similarly for pre-tax income and tax expense) and n_i is the number of MNE 1's affiliates in country *i*.

$$assets_{i,MNE1} = \sum_{j=1}^{n_i} assets_{j,i,MNE1}$$

$$pre\text{-}tax\ income_{i,MNE1} = \sum_{j=1}^{n_i} pre\text{-}tax\ income_{j,i,MNE1}$$

$$tax\ expense_{i,MNE1} = \sum_{j=1}^{n_i} tax\ expense_{j,i,MNE1}$$

2. The profit rate of MNE 1' country group of affiliates in country *i* ($profit\ rate_{i,MNE1}$) is calculated as the sum of pre-tax income of MNE 1's affiliates in country *i* divided by the sum of assets in MNE 1's affiliates in country *i*.

$$profit\ rate_{i,MNE1} = \frac{pre\text{-}tax\ income_{i,MNE1}}{assets_{i,MNE1}}$$

3. MNE 1's global profit rate ($profit\ rate_{g,MNE1}$) is calculated as MNE 1's consolidated pre-tax income divided by MNE 1's consolidated assets.

$$profit\ rate_{g,MNE1} = \frac{pre\text{-}tax\ income_{g,MNE1}}{assets_{g,MNE1}}$$

4. The effective tax rate of MNE 1' country group of affiliates in country *i* ($ETR_{i,MNE1}$) is calculated as the sum of tax expenses of MNE 1's affiliates in country *i* divided by the sum of pre-tax income of MNE 1's affiliates in country *i*.

$$ETR_{i,MNE1} = \frac{tax\ expense_{i,MNE1}}{pretax\ income_{i,MNE1}}$$

5. The countries where MNE 1 has affiliates are ranked by their effective tax rate. Low-tax countries are defined as countries with the lowest ETRs that account for 20% of the assets of the MNE. The average profit rate (weighted by assets) of low-tax countries is then calculated; *m* is the number of low-tax countries and *n* is the number of all countries where MNE 1 has affiliates.[24]

$$\sum_{i=1}^{m} assets_{i,MNE1} = 20\% \times \sum_{i=1}^{n} assets_{i,MNE1}$$

$$profit\ rate_{low,MNE1} = \frac{\sum_{i=1}^{m}\left(profit\ rate_{i,MNE1} \times assets_{i,MNE1}\right)}{\sum_{i=1}^{m} assets_{i,MNE1}}$$

6. MNE 1's profit rate differential (*profit rate diff*$_{MNE1}$) is then calculated as the ratio of MNE 1's profit rate in low tax countries divided by MNE 1's global profit rate.

$$profit\ rate\ diff_{MNE1} = \frac{profit\ rate_{low,MNE1}}{profit\ rate_{g,MNE1}}$$

B. Steps 1 to 6 are repeated for all MNEs in the sample.

C. The indicator for the given year is the average profit rate differential (weighted by assets) for all MNEs in the sample where *k* is the number of MNEs in the sample and *assets*$_{g,MNEi}$ is consolidated assets of MNE *i*.

$$Indicator = \frac{\sum_{i=1}^{k}\left(profit\ rate\ diff_{MNEi} \times assets_{g,MNEi}\right)}{\sum_{i=1}^{k} assets_{g,MNEi}}$$

Indicator 4: Profit rates compared to ETRs for MNE domestic and foreign operations

A. For MNE 1 in the sample and a given year, a profit rate differential is calculated as follows.

1. MNE 1's domestic profit rate (*profit rate*$_{d,MNE1}$) is calculated as MNE 1's pre-tax income from domestic operations (i.e. located in the country of MNE's highest parent company) divided by MNE 1's domestic assets from MNE 1's consolidated accounts. MNE 1's foreign profit rate (*profit rate*$_{f,MNE1}$) is calculated in the same way using pre-tax income and assets in foreign countries (i.e. located in countries other than the country of MNE 1's highest parent company).

$$profit\ rate_{d,MNE1} = \frac{pre\text{-}tax\ income_{d,MNE1}}{assets_{d,MNE1}}$$

$$profit\ rate_{f,MNE1} = \frac{pre\text{-}tax\ income_{f,MNE1}}{assets_{f,MNE1}}$$

2. MNE 1's profit rate differential (*profit rate diff*$_{MNE1}$) is calculated as the difference between MNE 1's domestic profit rate and MNE 1's foreign profit rate.

$$profit\ rate\ diff_{MNE1} = profit\ rate_{d,MNE1} - profit\ rate_{f,MNE1}$$

B. For MNE 1 in the sample and the given year, an effective tax rate (ETR) differential is calculated as follows.

1. MNE 1's domestic ETR ($ETR_{d,MNE1}$) is calculated as MNE 1's tax expense from domestic operations divided by MNE 1's domestic pre-tax income from MNE 1's consolidated accounts. MNE 1's foreign ETR ($ETR_{f,MNE1}$) is calculated in the same way using tax expense and pre-tax income in foreign countries.

$$ETR_{d,MNE1} = \frac{tax\ expense_{d,MNE1}}{pre\text{-}tax\ income_{d,MNE1}}$$

$$ETR_{f,MNE1} = \frac{tax\ expense_{f,MNE1}}{pre\text{-}tax\ income_{f,MNE1}}$$

2. MNE 1's ETR differential ($ETR\ diff_{MNE1}$) is calculated as the difference between MNE 1's domestic ETR and MNE 1's foreign ETR.

$$ETR\ diff_{MNE1} = ETR_{d,MNE1} - ETR_{f,MNE1}$$

C. Steps A and B are repeated for all MNEs in the sample.

D. The indicator for the given year is a simple correlation coefficient between a vector of profit rate differentials (i.e. *profit rate* $diff_{MNE1}$ to *profit rate* $diff_{MNEn}$) and a vector of effective tax rates differential (i.e. *ETR* $diff_{MNE1}$ to *ETR* $diff_{MNEn}$) where *n* is the number of MNEs in the sample.

$$Indicator = corr(profit\ rate\ diff, ETR\ diff)$$

Indicator 5: ETRs of MNEs compared to comparable domestic firms

This indicator would be calculated using affiliate-level financial statement information on taxes and other financial and economic characteristics. The indicator compares the ETRs of affiliates of top global MNEs in a country with matched, comparable domestic-only firms in the same country.

The matching process follows that described in Egger, Egger and Winter (2010).

Regression analysis using matched pairs of firms would provide estimates of tax differentials between domestic-only and MNE affiliates in the same country.

Indicator 6: Concentration of royalty payments relative to R&D expenditures

1. Year 2011 was chosen as a base year for Indicator 6. World Banks's World Development Indicators was the source of data on royalty receipts and R&D expenditures.

2. For each country *i*, the ratio of royalty receipts to domestic R&D expenditure was calculated.

$$royalty\ to\ R\&D\ ratio_i = \frac{royalty\ receipts_i}{domestic\ R\&D\ expenditures_i}$$

3. Countries are ranked by their royalty to R&D ratios. The five countries with the highest royalty to R&D ratios are selected and the weighted average royalty to R&D ratio for those five countries (*royalty to R&D* $ratio_{top5}$) is calculated. The weighted average royalty to R&D

ratio for the remaining countries (*royalty to R&D ratio$_{rest}$*) is calculated where *n* is the total number of countries for which data is available.

$$royalty\ to\ R\&D\ ratio_{top5} = \frac{\sum_{i=1}^{5} royalty\ receipts_i}{\sum_{i=1}^{5} domestic\ R\&D\ expenditures_i}$$

$$royalty\ to\ R\&D\ ratio_{rest} = \frac{\sum_{i=6}^{n} royalty\ receipts_i}{\sum_{i=6}^{n} domestic\ R\&D\ expenditures_i}$$

4. The indicator for 2011 is calculated as the ratio of royalty to R&D ratio of the top five countries to the ratio of royalty to R&D ratio of the remaining countries.

$$Indicator = \frac{royalty\ to\ R\&D\ ratio_{top5}}{royalty\ to\ R\&D\ ratio_{rest}}$$

5. Steps 2 to 4 are repeated for other years with the same top five countries identified in 2011 even if the countries are not the countries with the highest royalty to R&D ratios in the other years.

Indicator 7: Interest expense to income ratio of MNE affiliates in locations with tax rates above 25%

A. For MNE 1's affiliate 1 and the given year, an interest-to-income ratio differential is calculated as follows.

1. The interest-to-income ratio of affiliate 1 (*interest-to-income ratio$_{1,MNE1}$*) is calculated as interest expense (to both third parties and related parties) divided by EBITDA (earnings before interest, taxes, depreciation and amortisation).

$$interest\text{-}to\text{-}income\ ratio_{1,MNE1} = \frac{interest_{1,MNE1}}{EBITDA_{1,MNE1}}$$

2. MNE 1's global interest-to-income ratio (*interest-to-income ratio$_{g,MNE1}$*) is calculated as MNE 1's interest expense divided by MNE 1's EBITDA from consolidated accounts.

$$interest\text{-}to\text{-}income\ ratio_{g,MNE1} = \frac{interest_{g,MNE1}}{EBITDA_{g,MNE1}}$$

3. Affiliate 1's interest-to-income ratio differential (*interest-to-income ratio diff$_{1,MNE1}$*) is calculated as affiliate 1's interest-to-income ratio minus MNE 1's global interest-to-income ratio.

$$interest\text{-}to\text{-}income\ ratio\ diff_{1,MNE1} = interest\text{-}to\text{-}income\ ratio_{1,MNE1} - interest\text{-}to\text{-}income\ ratio_{g,MNE1}$$

B. Steps 1 to 3 are repeated for all affiliates and all MNEs in the sample.

C. Affiliates with interest-to-income ratio differential greater than zero located in countries with a combined CIT rate of 25% or more are identified.

D. The indicator for the given year is calculated as the sum of interest expenses of affiliates selected in step C divided by the sum of interest expenses of all affiliates where k is the number of all MNEs in the sample, n_i is the number of affiliates of MNE i and m_i is the number of affiliates of MNE i selected in step C.

$$Indicator = \frac{\sum_{i=1}^{k} \sum_{j=1}^{m_i} interest_{j,MNEi}}{\sum_{i=1}^{k} \sum_{j=1}^{n_i} interest_{j,MNEi}}$$

Chapter 3

ECONOMIC ANALYSIS OF THE SCALE AND ECONOMIC IMPACT OF BEPS AND COUNTERMEASURES

Key points:

- There is a large and growing body of evidence of the existence of BEPS, stemming from hundreds of empirical analyses and specific information relating to the tax affairs of certain MNEs that has emerged from numerous legislative and parliamentary enquiries.

- Despite this growing evidence of BEPS, estimates of its scale (i.e., magnitude of the fiscal losses) and economic impact are limited by both conceptual issues (i.e., defining the "counterfactual" of a world without BEPS) as well as the considerable limitations of the currently available data. Since BEPS is not directly observable, even with improved data the scale of BEPS will require estimation.

- This chapter summarises some of the empirical economic and statistical analyses previously undertaken using a variety of data sources and sets forth two proposed approaches to undertaking analyses of the scale and economic impact of BEPS and the effectiveness of BEPS countermeasures under Action 11.

- Any analysis of the scale of BEPS must make a comparison of the world with BEPS with an unobservable alternative that reflects what the world would have been without BEPS (i.e., "counter-factual"). Policymakers should not just be concerned about the current scale of BEPS, but also what the future scale of BEPS would be without internationally-coordinated rules to address BEPS.

- Existing empirical analyses find BEPS occurring through multiple channels of international corporate tax avoidance: hybrid mismatch arrangements; excessive interest deductions; harmful tax practices; treaty abuse; artificial avoidance of permanent establishment; transfer pricing outcomes that are not aligned with value creation; and by the circumvention of any applicable anti-avoidance measures, such as controlled foreign corporation (CFC) rules.

- Attempts to estimate the scale of BEPS raise many conceptual as well as practical issues. One approach would be to estimate an overall revenue effect of BEPS by extrapolating from studies of profit shifting using the estimated tax responsiveness of shifted financial profit to tax rate differentials. Another approach would be to estimate the revenue effects by reference to the individual BEPS channels. Both approaches have advantages and disadvantages, and could be drawn upon as part of the economic analysis to be undertaken under Action 11.

- While improved data sources are needed to further the understanding of the scale and economic impact of BEPS, this chapter proposes that the approach to be undertaken under Action 11 involve some new analyses to complement a synthesis of existing economic analyses. In undertaking such analyses, it will be necessary to determine whether the estimation of a range of magnitude of the scale of BEPS is appropriate given the significant limitations in the currently available data.

I. Overview

97. A survey of the academic and empirical literature reveals over one hundred studies have found the presence of BEPS. A recent review of the empirical literature by Dharmapala (2015) does not report a single empirical study not finding some evidence of BEPS. Another review of the academic literature by Riedel (2014) concludes: "Existing studies unanimously report evidence in line with tax-motivated profit shifting (despite using different data sources and estimation strategies)."

98. A common theme of these studies has been the finding that profits are being shifted from high-tax countries to low-tax countries and that there is substantial evidence of a "disconnect" between the jurisdictions where MNEs are recording their taxable profits and the locations where the economic activities that generate these profits are taking place. The studies find empirical evidence of BEPS through various channels, including through: transfer pricing, the strategic location of debt and intangible assets, treaty abuse, and the use of hybrid mismatch arrangements. Government analyses and academic studies have also found that certain measures enacted to address BEPS activity have been effective in protecting the revenue bases of the countries implementing these measures.[25]

99. While the various academic, government and empirical studies undertaken find BEPS is occurring, there is less certainty over the scale or extent to which it is occurring. Scale is defined as the magnitude of the change in overall tax receipts. To date, most studies have focused on individual countries or individual BEPS channels rather than attempt to achieve a comprehensive global estimate of the scale of BEPS activity. Riedel (2014) reports that the estimates of profit shifting range from less than 5% to more than 30% of the income earned by MNEs in high-tax affiliates being transferred to lower-tax entities. While most of the studies focus on shifting financial profits (not taxable income) and do not include instances of "stateless income", such a large range shows the significant uncertainty surrounding the estimation of the magnitude of BEPS. Due to differences in pre-tax profits reported in financial statements and taxable income, plus tax credits, the percentage change in corporate tax revenues could be even higher than the percentage change in pre-tax reported profits.

100. Indeed, the two key challenges facing any attempt to undertake an economic analysis of BEPS that arrives at credible estimates relate to: questions of methodology and the availability of data. While Chapter 1 discusses the significant limitations of currently available data, this chapter focuses on the methodological issues involved in undertaking economic analyses of the scale and economic impact of BEPS and BEPS countermeasures. It should be noted that few of the academic estimates of profit shifting attempt to estimate the total tax benefits to MNEs or revenues lost to governments.

Defining BEPS

101. A number of academics have noted the importance of clearly defining BEPS for the purposes of quantifying the effects of BEPS for Action 11. It is useful to highlight the description of BEPS from the September 2013 Action Plan on Base Erosion and Profit Shifting:

> *BEPS relates chiefly to instances where the interaction of different tax rules leads to double non-taxation or less than single taxation. It also relates to arrangements that achieve no or low taxation by shifting profits away from the jurisdictions where the activities creating those profits tax place. No or low taxation is not per se a cause of concern, but it becomes so when it is associated with practices that artificially segregate taxable income from the activities that generate it. In other words what creates tax policy concerns is that, due to gaps in the interaction of different tax systems, and in some cases because of the application of bilateral tax treaties, income from cross-border activities may go untaxed anywhere, or be only unduly lowly taxed.*

102. The above description helps focus the scope of BEPS. BEPS is about international tax avoidance, i.e. exploiting differences in different countries' tax systems. Tax evasion by individuals or corporate non-compliance with domestic tax rules does not constitute BEPS. Purely domestic tax avoidance is not part of the BEPS project. Differences in countries' tax rates do not amount to BEPS on their own. However, artificial arrangements put in place to exploit these differences are BEPS. With the growing reliance of modern business on intangible property and risk as part of global value chains, it becomes more difficult to identify where the activities creating profits take place without better data, careful transfer pricing analysis of individual transactions, and other income measurement rules. Working with currently available data and the difficulties of measuring where value is created are both fundamental difficulties associated with measuring the scale of BEPS. If economic functions, assets and risks are effectively relocated to another country to take advantage of a low rate or tax credit, this does not constitute BEPS. Such activities are considered to be responses to tax competition where, for example, an entity responds to a tax incentive to invest in a greenfield project that entails building a factory. This is different from arrangements that highly leverage affiliates in a high-tax rate country through related party debt. BEPS is often the result of: transfers / acquisitions of intangible or mobile assets for less than full market value; the over-capitalisation of low-tax rate group companies; the excessive-leveraging of high-tax rate group companies; and from contractual allocations of risk to low-tax jurisdictions in structures and transactions that would be unlikely to occur between unrelated parties.

103. One approach used under Action 11 is to refer to the specific BEPS channels identified in the various Action Items set out in the BEPS Action Plan. The 15 Action Items have all been agreed to by consensus among the G20/OECD countries participating in the BEPS Project. By analysing BEPS with reference to the individual BEPS channels, the work undertaken under Action 11 will draw upon the consensus reflected in the BEPS Action Plan. The scope of each of the BEPS channels will be specifically defined as part of the work carried out under the various Action Items, so the measurement will be more closely related to what individual governments would be estimating for the fiscal and economic impacts of the BEPS Project. Since a number of the Action Items will be completed simultaneously with Action 11, the estimates of the effects of the BEPS channels will have to be ranges to cover the different options within the Action Items, but ranges are also appropriate given the limitations of the data and the inherent difficulty of estimating BEPS.

Important considerations in the economic analysis of BEPS and countermeasures

104. By definition, BEPS behaviours involve artificial shifting of profits without changes in the location where the activities creating those profits takes place, and when the interaction of different tax rules leads to double non-taxation or less than single taxation. In some cases, MNEs may undertake minimal economic activity as part of artificial arrangements that shift profits away from where the value is created simply to claim tax benefits under current national tax rules.

105. Addressing BEPS will increase effective tax rates of tax aggressive MNEs, which can have economic effects on the location of economic activity. Effective tax rates will be closer to countries' statutory corporate tax rates when BEPS countermeasures are implemented. Differences in countries' statutory and effective corporate tax rates will continue to exist after the BEPS Project, but they will not be reduced due to artificial arrangements. When evaluating the economic effects of BEPS, several important issues will need to be factored into the analysis.

106. First, the economic effects of unilateral tax policy changes by an individual country are very different from the economic effects of internationally coordinated multilateral changes, such as those proposed under the BEPS Action Plan. If all countries (or the vast majority of countries where real economic activity takes place) adopt similar countermeasures, then MNEs will not be able to change the location of their BEPS-related activities to avoid them. Currently, if one country were to adopt tough BEPS

countermeasures, then MNEs could move their activities to continue BEPS behaviours elsewhere. Most individual countries would be expected to raise more revenue from BEPS countermeasures with internationally-coordinated rules than with unilateral country measures.

107. Second, economic analyses of BEPS countermeasures should be considered in a balanced-budget context. For purposes of balanced-budget analysis, any potential additional tax revenues from BEPS countermeasures could be assumed to lower taxes on other economic actors or be used to invest in public infrastructure or services. Any tax increase will have some adverse effects, but BEPS is a structural, not a macroeconomic, tax policy change. Balanced-budget assumptions are used in many tax policy analyses to isolate structural tax effects. Similarly, the effect on one group of business is only part of the overall effect, since other businesses will benefit when BEPS is corrected.

108. Third, although prior OECD analysis[26] has concluded that the corporate income tax is the least conducive tax to economic growth, the effects of BEPS countermeasures are different to changes in corporate tax rates or other structural tax changes. Increasing corporate income taxation by ending artificial schemes by a "self-selecting" group of tax aggressive MNEs is not necessarily adverse to economic growth since it would reduce differential taxation across businesses and eliminate tax-induced competitive advantages. Individual MNEs' ability to achieve significant corporate tax reductions due to BEPS behaviours distorts resource allocation, and shifts talent to tax planning rather than more productive activities.[27]

109. Finally, as will be noted below, the economic analyses and estimates of BEPS and BEPS countermeasures are subject to significant uncertainty given the difficulty of disentangling BEPS activity from MNEs' real economic activity and the significant limitations of currently available data. Multiple approaches finding similar ranges provide greater certainty than individual studies using one methodology relying upon a single data source. Any statistical estimate has a range of uncertainty given the sample used and the unexplained variance of the underlying economic activity. Extrapolations beyond the sample from which an analysis is conducted is a further source of uncertainty since it is not known whether the unobserved actors have the same behaviours as the observed actors. Often, policymakers must make decisions with incomplete and imperfect information, but clearly stating the limitations of existing BEPS analyses, including the analyses undertaken as part of Action 11, will be important.

II. Methodologies for measuring BEPS

110. Apart from existing data limitations, the need to develop a clear methodology for measuring BEPS was the second most cited problem facing government tax policy analysts, according to the country survey conducted by the CFA's Working Party No.2, which was completed by 37 governments.

111. One of the key methodological questions relates to the question of how the scale and economic impact of BEPS can be measured. A number of studies have sought to compare the geographic location of profits reported by MNEs, which are affected by BEPS behaviours, with a "counterfactual" of a world without BEPS, where the location of profits is aligned with the location of the economic activity that generated those profits. Without specifying individual BEPS behaviours, these studies take an aggregate approach and examine the effect of profit shifting due to differences in tax rates.

112. An additional approach taken by a number of studies is to identify and measure specific BEPS behaviours. Examples include quantifying the effects of non-arm's length transfer pricing, excessive interest deductions, and treaty abuse. Measuring specific BEPS behaviours enables researchers to use different types of data sources, such as special trade data to analyse transfer pricing or investment flows for treaty abuse. BEPS behaviours are driven by differences in tax rates or differences between tax systems

that can be exploited to reduce taxation. A disaggregated approach could focus on specific practices that artificially segregate taxable income from the activities that generate it.

113. Given the many uncertainties associated with estimates of the scale and economic impacts of BEPS, using multiple approaches and seeing where their ranges overlap should provide more comfort to policymakers than relying on a single approach or a single data source.

An Aggregate Tax Rate Differential Approach

114. One of the key methodological challenges is to ensure that the economic analysis distinguishes between quantifying the effects that result from BEPS related activity as compared to the real economic activity of MNEs. Many studies have sought to overcome this challenge by comparing the geographic location of profits reported by MNEs, which are affected by BEPS behaviours, with a "counterfactual" that estimates the geographic location of profits based on real economic activity on a country-specific or company-specific basis. The counterfactual is intended to capture the way taxable profits should be reported in a world without BEPS (i.e., where the location of profits is aligned with the location of the economic activity that generated those profits).

115. This approach involves a comparison of how MNEs are currently reporting profits to a "counterfactual" of taxable profits in a world without BEPS. The difference between the two amounts is the estimate of the amount of BEPS. This approach dates to a seminal paper by Hines and Rice in 1994, which attempted to separate profit shifting from profits from real economic activity. With the increasing availability of firm-level databases, the approach has been able to hold constant more of the measures of real economic activity than was previously available using aggregate country data.

116. The aggregate tax rate differential approach can be characterised in the following equation:

The aggregate tax rate differential approach

$$Tax\ revenue\ lost\ from\ total\ BEPS = \sum(Profits\ without\ BEPS_i - Reported\ profits_i) * \mathrm{MTR_i}$$

where $_i$ is for each country or company and MTR is the marginal tax rate on the profit shifted.

117. The aggregate tax rate differential approach requires the estimation of a hypothetical situation (i.e., a situation that does not exist). Ideally, the allocation of a MNE group's profits across its different affiliates could be estimated using information about their production function (e.g., different types of labour, different types of capital [physical, intangible, financial, public infrastructure available, etc.], business processes, functions, risks, etc.). As detailed in Chapter 1, the currently available data is missing or has measurement issues for a number of important generators of profits. Nonetheless, the available data and existing studies using this approach do find that shifted profits (the difference between reported profits and estimated profits based on country or company-specific economic characteristics) are affected by country tax rate differentials.

118. For the purposes of measuring the counterfactual of a world without BEPS, there are many different and competing perspectives on where profits should be considered to be created for the purposes of differentiating between BEPS and real economic activity. This lack of agreement typically arises over differing views regarding the approach to be taken on two key questions, namely:

- What activity generates profits? and
- Where are the activities that generate profits located geographically?

What activity generates profits?

119. One difficulty that arises from a review of the empirical economic literature is that there is no agreement on what economic activities generate profits, which is critical to measuring BEPS under the aggregate tax rate differential approach. Some economic studies suggest that profits are generated where the factors of production (labour and capital) are located, whereas other economic studies suggest that profits are generated where sales occur. Some other economic studies suggest that profits are generated based on a combination of labour, capital and sales. What is clear is that there is no universal acceptance of the answer to this key question of what activity actually generates profits.

120. The measurement problem is exacerbated by how capital, sales and labour are typically measured. Total assets generally do not include intangible capital assets, which are important generators of value especially in today's economy, but are also highly mobile. Investments in intangible assets, such as R&D expenditures, are generally deducted or 'expensed' in the year of the investment for financial statement accounting, and thus are not included in the value of total assets, except for certain intangibles acquired in an acquisition or purchase. Sales are often measured where the sales are from (i.e., origin or production location) rather than where the final consumers are located (i.e., market perspective). Labour is often measured by the number of employees, but this measure may not distinguish between full-time and part-time employees, or differences in productivity or value added per labour hour. A MNEs labour presence may be measured by total employee compensation, but similar to sales, employees often work in multiple jurisdictions during a year, not just in the jurisdiction of incorporation.

Where are the profits generated?

121. Just as there is no agreement on the activities that generate profit, there is considerable disagreement over the key question of where profits are generated. Many of the existing economic studies implicitly define the location "where the activities creating profits take place" in the methodologies employed in their empirical analyses. For example, some economic studies use a profit rate (measured as the ratio of profit-to-sales or profits-to-assets) to test whether financial statement profit is shifted between affiliates based on tax rate differentials.

122. Most of these economic studies use regression analyses to measure BEPS due to tax rate differentials, with other non-tax variables as explanatory variables to explain the creation of real economic profits. The economic studies define real economic profits by reference to the measure used in the profit ratio (e.g., sales or assets) and by the explanatory variables (e.g., size, headquarters location, industry etc.).

123. To measure where economic value creation takes place, one has to construct a specification of the production function for the entity. In the case of transfer pricing, consideration of the production function is usually referred to as the functions, risks and capital of the MNE. A production function would not only take into account the usual factors of production: low-skill labour, high-skill labour and physical capital; but research and development (R&D) and other intangible capital, public infrastructure; industry agglomeration effects; and synergies with other affiliates in the MNE. Thus, the typical empirical specification of profits as a percent of total assets, sales, or employment or some combination does not take into account all relevant components of the production function. Omitted variables in the analyses will have at least two effects: the explanatory power of the regression will be weak and tax shifting responsiveness may be affected by the omitted variables.

Steps in an aggregate tax rate differential approach

124. An aggregate tax rate differential approach would take estimates of the tax responsiveness of profit shifting to estimate the amount of shifted profits due to tax rate differentials. The tax responsiveness

estimates might be chosen based on a meta-analysis or for specific analyses of individual countries. Besides data limitations, as the discussion above noted there are issues in relation to the specification of actual factors affecting profitability, the measure of profitability, the measure of the tax rate, etc. Most of the regression analyses do not weight the different entities for size with the result that small entities have the same influence on the tax responsiveness as larger entities. Most existing analyses do not test whether the tax responsiveness varies in a non-linear fashion (e.g., whether larger tax rate differences have larger effects). In some cases, financial profits are shifted from a country, but are not subject to tax in another country due to hybrid mismatch arrangements or the entities not being subject to tax in any country. Whether these entities and hybrid mismatch arrangements are included in the analyses is not clear.

125. Applying profit shifting responsiveness to tax rate differentials across countries would enable an estimate of the amount of profit shifting based on the differences in countries' corporate tax rates. High tax rate countries would have profit shifted from them, while lower tax rate countries would have profit shifted to them. Converting the shifted profit to a change in corporate income tax collection would require several assumptions involved in the estimate. The percentage change in corporate taxes would be higher than the percentage change in shifted profits in countries where taxable income is less than financial income, due to book/tax differences such as accelerated depreciation, and the fact that some MNEs claim corporate tax credits. For example, if taxable income is 90% of reported financial profits and corporate tax credits account for 10% of corporate taxes before credits then a profit shifting estimate of 10% would result in a 12.3% reduction in corporate revenues.

126. As with any estimation of the scale of BEPS, the underlying data, methodology and assumptions, sensitivity analysis and providing a range of any estimates would reflect the uncertainty of such estimates of the scale and economic impact of BEPS.

A Specific BEPS channels approach

127. A second approach is to measure BEPS by reference to specific BEPS channels. A recent survey of the academic literature by Nadine Riedel (2014) states: "The most convincing empirical evidence has been presented by academic studies that investigate specific profit shifting channels as their empirical tests are more direct and offer less room for results being driven by mechanisms unrelated to income shifting."

128. Specific BEPS channels have been identified in the BEPS Action Plan. These action items have been agreed to by consensus by the G20 and OECD countries participating in the BEPS Project, which include:

- hybrid mismatch arrangements (Action 2);
- routing income of a resident enterprise through a non-resident affiliate that take advantage of weak CFC rules (Action 3);
- excessive interest deductions (Action 4);
- harmful tax practices (Action 5);
- treaty abuse (Action 6);
- the artificial avoidance of Permanent Establishment status (Action 7);
- transfer pricing outcomes that are not aligned with value creation (Actions 8-10).

129. The BEPS channels approach, which calculates the sum of all identified BEPS channels, is characterised by the following equation:

The BEPS channels approach

$$Tax\ revenue\ lost\ from\ total\ BEPS = \sum [BEPS\ from\ each\ channel_i + interactions] * MTRi$$

where $_i$ is for each BEPS channel and MTR is the marginal tax rate on the profit shifted. Interactions include cases where two or more BEPS channels affect the same income, potentially leading to double-counting, or where two or more BEPS countermeasures discourage profit shifting with greater effect than the implementation of the countermeasures would have had if implemented in isolation.

130. This approach maintains consistency and ensures coherence with the approach taken more broadly across the BEPS Project. This approach also provides a clear basis for an assessment of the expected impacts of the countermeasures that will be proposed to be implemented to address BEPS, which is another element of the work to be carried out under Action 11.

131. While measuring specific BEPS channels is more direct, many of the same data and methodological issues arise. The BEPS channels approach also requires specific consideration be given to the interaction of the different BEPS channels (e.g., possible overlap or complementarities) in producing a total BEPS estimate. For example, the tax challenges of the digital economy (Action 1) are being addressed through the other Action Items, in particular the work on artificial avoidance of permanent establishment, transfer pricing and on CFC rules. Interactions may arise within the same BEPS channel if there is lack of coordination of measures between jurisdictions, which could result in double taxation or double non-taxation.

132. It should be noted that some of the Action Items do not directly identify specific BEPS channels, but may involve new measures that help address BEPS and thus increase the effectiveness of countermeasures. The following Action Items could have positive effects on BEPS countermeasures:

- Data and economic analysis (Action 11 – due to increased transparency);
- Disclosure of aggressive tax planning arrangements (Action 12 - due to increased transparency);
- Additional transfer pricing documentation (Action 13 - due to increased transparency);
- Improved dispute resolution (Action 14 – due to added certainty to taxpayers and the potential for the reduction of double taxation);
- The multilateral instrument (Action 15 – due to timelier implementation of the coordinated international policy response).

133. A potential limitation of the BEPS channels approach being used is that some analysts may consider the focus on BEPS channels to be too narrow, and may not include other BEPS-like behaviours that emerge in the future. Proposed BEPS countermeasures may stop short of addressing 100% of the impact of BEPS behaviours out of consideration of administrative costs for tax administrations and businesses. Thus, the BEPS channels approach will result in a lower bound estimate of BEPS, assuming the overlaps between channels are captured in the analysis. However, where any additional BEPS channels are identified in the future, they could be added to the working definition of BEPS. Care will need to be taken to avoid double-counting to the extent that the BEPS channels may overlap in practice. The BEPS channels approach also requires a comparison of a counterfactual and needs to include potential behavioural effects. At the individual country level, the BEPS channels approach may be estimated by governments using their own administrative databases, which will often include tax return data.

Steps in a BEPS channels approach

134. In incorporating the BEPS channels approach, the work carried out under Action 11 will involve economic and fiscal analysis familiar to government policy analysts responsible for analysing proposed tax legislation. This involves a number of discrete steps in the analysis.

135. First, there is a need to produce a synthesis of the existing empirical studies for each of the BEPS channels. For example, the Working Party No.2 country survey identified seven countries currently in the process of analysing BEPS.

136. The second step is to analyse the proposed BEPS channels' countermeasures relative to the current law treatment of those BEPS channels across countries. For example, some countries have already enacted certain limitations, while other countries have not. The Working Party No.2 country survey identified a number of countries that have analysed enacted and proposed legislation of BEPS countermeasures.

137. The third step is to analyse each BEPS channel and apply the understanding of the empirical literature's estimates of taxpayer behaviours for the channel, with the specifics of the current and proposed tax law for the channel and country, with the available data for the channel and country.

138. The fourth step is to aggregate the estimates of the potential economic and fiscal effects for each of the BEPS channels, taking into consideration possible overlap of the countermeasures and potential interactions with other BEPS actions that facilitate a response that expedites the addressing of BEPS, such as increased transparency.

139. The fifth step is to aggregate the estimates of the potential economic and fiscal effects for individual countries (or groups of countries) to a global estimate for each BEPS channel.

140. This type of analysis will face many of the same data limitations as other empirical analyses of BEPS, and will require making a number of assumptions. The results may be presented as ranges of the general magnitude of the effects of individual BEPS channels, or it may be more appropriate to present a single global range for overall BEPS. The presentation of the results would need to clearly identify the data limitations as well as the key assumptions required for the estimate of the ranges.

Pros/cons of two approaches

141. The box below highlights the pros and cons of the two proposed approaches for analysing the scale of BEPS. Neither has a clear advantage, and there are advantages to using multiple approaches. Other potential approaches would be considered. For example, given the dynamic nature of competitive markets and BEPS, the potential maximum level of BEPS, taking into account the costs of compliance, has been suggested as a third possibility. This, however, would be relevant if internationally-coordinated BEPS countermeasures are not implemented.

Approach	Pros	Cons
Aggregate tax rate differential approach	• Attempts to capture all BEPS channels • Attempts to separate real economic effects from BEPS • Can be applied to many MNEs and affiliates for testing	• May miss BEPS if hidden in available data • Requires good estimation of profitability to separate effects • Tax variable may be incorrect for the shifted income
BEPS channels approach	• Similar approach to what individual countries will estimate for BEPS countermeasures • Often more direct estimation of the profit shifting • In line with G20/OECD BEPS Action Plan	• Requires more detailed data for each specific channel • Requires estimate of potential overlap and synergies of multiple channels • Dependent on specific recommendation of BEPS action items

Box 12. Different tax variables used in BEPS and tax policy analyses

Empirical analyses of BEPS, particularly regression analyses, use tax rate differentials to estimate potential BEPS responses. There are a number of different tax rates used by policy analysts and each of the tax variables has limitations, which are important to understand.

Statutory corporate tax rates are generally thought of as the appropriate measure of the tax incentive for shifting taxable profits between countries. For example, if 100 euros of taxable income is shifted from a country with a 25% statutory corporate tax rate to a country with a 0% tax rate, then the MNEs tax would be reduced 25 euros. However, in many cases statutory tax rates are not the correct measure of the tax benefit from BEPS. This is because some countries have tax base provisions, such as a deduction that result in a different tax rate from the statutory tax rate being applied to the shifted income. For instance, countries with allowances for corporate equity provide a deduction for notional interest on equity, so would have less incentive to use interest expense to shift profits. In some cases, countries with high statutory tax rates may have significantly lower tax rates on shifted income, so income is shifted into the country rather than out of the country. Withholding taxes may also be payable or avoided on flows associated with BEPS.

Effective *tax rates (ETRs)* come in a number of variations and are useful for different types of analyses:

Effective tax rates applicable to shifted income would be the ideal measure for BEPS analysis, but are often not known and have to be estimated. In some cases the ETR is the same as the statutory tax rate, but in others it may be set by one of the countries involved. Shifted income may be subject to a preferential tax rate or a rate determined by a tax ruling.

Backward-looking average effective tax rates (AETR) are also used to measure the effects of BEPS, but often are inexact measures of the incentives to shift taxable income. AETRs may be closer to what companies actually pay in tax and reflect all aspects of the corporate tax system. However, they are a backward-looking metric, reflecting historical tax effects (e.g. depreciation from prior investments, loss deductions from prior years taken against current year taxable income, etc.) and non-BEPS tax provisions (e.g. R&D and energy tax credits). AETRs are often computed from financial statement data, and thus identify the country of incorporation not tax residence, and computed from accounting tax expense, rather than tax liability or cash taxes paid, as described in Chapter 1.

Forward-looking marginal and average effective tax rates (FL-METRs and FL-ATRs) are calculated using hypothetical companies to illustrate the tax on a future investment. FL-METRs are used to analyse domestic investment incentives at the margin, but are increasingly recognised as inappropriate for measuring MNEs' decisions on the location of high-return intangible assets. FL-ATRs illustrate the tax on the total return or economic profit of an investment, particularly for investments earning above a competitive return, for purposes of considering the location of that investment across different countries. Hypothetical companies are fact-specific and difficult to weight to be representative, plus they do not capture all of the important tax aspects of the corporate tax structure, particularly international tax rules.

Tax policy analysts are still grappling with which tax rate(s) should be used to empirically estimate the effects of BEPS. Sensitivity analysis can be used to determine if the choice of tax rate makes a significant difference.

III. Economic Analyses of the Scale BEPS and Countermeasures

142. A burgeoning academic and other empirical literature on BEPS is continuing and reports significant BEPS occurring due to tax rate differentials. The bibliography has a select listing of articles and reports. A recent survey of the literature on profit shifting has been produced by Dharmapala (2014) and Riedel (2014). Several meta-analyses of profit shifting which analyse prior empirical studies have been undertaken by DeMooij and Ederveen (2008) and Heckemeyer and Overesch (2013). These studies all report significant BEPS among MNEs.

143. The range of studies previously undertaken use many different types of data, including individual firm-level financial statement data, national aggregate statistics, confidential government company surveys, export and import pricing data, and in some cases corporate tax returns. Recent studies have increasingly examined specific BEPS behaviours, such as interest deductibility and transfer pricing.

144. Most of the analyses are limited to MNEs headquartered in single countries, where access to company surveys, corporate tax returns, or company trade data are made available to researchers on a confidential basis, or based on analyses of MNE affiliates in multiple countries from a limited number of financial databases. For instance, a number of studies have used confidential information from MNEs headquartered in Germany and the United States and their global affiliates, based on mandatory investment surveys from the German Bundesbank and the US Bureau of Economic Analysis. Similar data unfortunately is not available for other countries, and thus the results from these studies are specific to those countries, and would not necessarily be representative for other countries due to differences in tax rates and tax rules, differences in the industry mix and other country differences.

145. There have been several studies of customs and trade data to identify non-arms' length intra-group pricing, but that has also been with individual country data. Extrapolation of the BEPS found in these studies beyond the specific countries would rest on a critical assumption that the BEPS behaviours are of similar magnitude in other countries.

146. Academic studies have also taken advantage of the availability of cross-country databases of company financial records. Many economic analyses have used the BvD's Amadeus database which is limited to European companies. Similar to individual country analyses, the results from these studies are specific to Europe, but would not necessarily be representative for other countries. More recently, a number of academic studies have turned to global databases such as BvD's ORBIS database. These have the advantage of including more than just European countries, but as described in Chapter 1 the coverage is limited. Various analyses have taken different approaches, with some analysing profit shifting from parents to affiliates and others analysing profit shifting between unconsolidated affiliated entities.

147. Most academic studies have not taken their estimates of BEPS based on the sample data to extrapolate to provide an estimate of the fiscal effects. Fiscal estimates require significantly more information than just the average responsiveness of financial profits to a change in tax rates. Financial statement profits generally differ from taxable income due to differences in accounting and tax rules. Companies with negative taxable income in a given year generally cannot receive a tax refund in that year, but must carry forward any tax losses to future years. Further, the relationship between income and tax liability is not proportional due to the extensive use of tax credits in many countries. A number of countries have estimated the fiscal effects of enacted legislation and legislative proposals to address BEPS.

148. There have been few attempts at producing an overall estimate of the worldwide fiscal effects of BEPS, and those that have been attempted and published have been based on relatively crude methodologies. For example, the IMF Spillovers Analysis (2014) cites a five percent loss of global corporate income tax revenue, but the measure is based on a simple corporate tax efficiency ratio which

does not separate real economic effects and tax policy and administration differences across countries from BEPS behaviours. That study suggested that revenue losses as a percent of corporate tax revenues in developing countries could be several multiples of those in developed countries, due to weaker enforcement resources. Several non-government organisations (NGOs) have published figures which are often multi-year estimates based on trade or total corporate tax numbers, but do not attempt to separate real economic activity from BEPS behaviours, and often include estimates of individual income tax evasion or non-compliance. On-going OECD analysis on Action 11 is focusing on revenue loss estimates using the two approaches.

General BEPS economic analyses

149. Six studies of general BEPS behaviours illustrate the range of databases, tax variables and methodologies used.

150. Two studies have undertaken a meta-analysis of prior profit-shifting studies and report a tax semi-elasticity of subsidiary pre-tax profits. De Mooij and Ederveen (2008) and Heckemeyer and Overesch (2013) report a tax semi-elasticity of subsidiary pre-tax profits of -1.2 and -0.8, respectively; where a 10 percentage point increase in the tax variable reduces financial statement profits by 12 and 8 percentage points, respectively.

151. Two recent studies provide useful summaries of the empirical analysis of BEPS. Dharmapala (2014) summarises the empirical literature of profit shifting analyses and reports that the more recent empirical literature finds the estimated magnitude of BEPS to be smaller than that found in earlier studies. The change seems mainly due to the increasing recent use of micro firm level data, which is able to hold more non-tax factors constant, compared to aggregate data across countries. Reidel (2014) reports that existing studies unanimously report evidence in line with tax-motivated profit shifting, but there is a wide range of estimates from 5-30%.

152. Two examples of specific studies are Grubert (2012) and Huizinga and Laevan (2008). Grubert (2012) uses a sample of US corporate tax return data of large non-financial US-based MNEs to investigate the role of taxation in the large increase in the foreign share of total income of US MNEs between 1996 and 2002. The paper finds that companies with lower foreign effective tax rates have higher foreign profit margins and lower domestic profit margins. The analysis finds that introduction of the "check-the-box" regulation in 1997 accounted for a significant fraction of the reduction in the foreign effective tax rates. The analysis shows that R&D intensity reduces foreign effective tax rates, indirectly indicating that the strategic location of intangible assets can facilitate BEPS.

153. Huizinga and Laeven (2008) analyse the proprietary Amadeus database of European MNEs unconsolidated affiliate financial statement information to investigate profit shifting incentives due to international tax differences. The tax variable is the average of bilateral differences in statutory tax rates between companies in the same group. The analysis uses earnings before interest and taxes as the dependent variable. Considering both tax differentials among foreign affiliates and tax differentials between parents and foreign affiliates, they find evidence of profit shifting, both among foreign subsidiaries and between parent companies and their affiliates abroad. Finally, they estimate the associated revenue implications for each country by comparing the actual profit shifting outcome to a theoretical benchmark without profit shifting. They find a semi-elasticity of reported profits with respect to the top statutory tax rate of 1.3.

Neutralising the Effects of Hybrid Mismatch Arrangements (Action 2)

154. Hybrid mismatch arrangements have been discussed descriptively in a number of papers, but have not been empirically analysed. Grubert (2012) analysed US tax return data and found that disregarded entities often involved hybrid structures. Several countries have estimated the effects of proposed legislation addressing hybrids.

Strengthening CFC Rules (Action 3)

155. Two recent empirical studies examine the effect of consolidated foreign company tax rules on MNE behaviour.

156. Ruf and Weichenrieder (2013) use the German Micro-database Direct Investment (MiDi) data on German MNEs to investigate the effect of the change of Germany's CFC legislation in response to a decision by the European Court of Justice (ECJ). The ECJ ruled that German CFC legislation infringed on the freedom of establishment within the European Union, and thus could not be applied to CFCs in EU countries. The analysis found that after the liberalising CFC legislation, passive investments in low-tax European countries increased compared to low-tax non-European countries, signalling that the prior CFC rules limited shifting of passive investments of German MNEs.

157. Markle and Robinson (2012) investigate whether CFC rules, bilateral tax treaties and withholding taxes affect the tax behaviour of MNEs. Using ORBIS and COMPUSTAT data, they find that CFC legislation as well as other measures reduce the activity of affiliates in "tax haven" countries.

Limit Base Erosion via Interest Deductions (Action 4)

158. Several studies have found that MNEs' strategic placement of debt and the associated interest deductions are sensitive to tax differentials and tax interest limitations.

159. Desai, Foley and Hines (2004) use US Bureau of Economic Analysis investment survey data to identify the determinants of the capital structure of foreign affiliates of US MNEs. They find that higher tax rates increase the use of both external and internal debt for US foreign affiliates, with a more intense effect on internal debt. They control for a credit market imperfection proxy, as companies might increase their internal debt to total debt ratio, not only with the objective of shifting profit through interest expenses, but also in order to overcome credit market imperfections. They find that companies in countries with a less developed credit market are keener on borrowing from related parties (in particular from parent companies). They find that "Ten percent higher local tax rates are associated with 2.8% higher debt/asset ratios, with internal borrowing being particularly sensitive to taxes".

160. Huizinga, Laeven and Nicodème (2008) use the European Amadeus database to test whether differences in taxation among countries have a statistically significant effect on the firm's capital structure and on internal debt. They include both marginal effective tax rates and an indicator of the tax incentive to shift debt (calculated as the sum of international tax differences weighted by local assets), and find a statistically significant effect on firm's leverage, indicating that debt shifting might occur, not only between parent and subsidiaries, but also among foreign subsidiaries. They find "an increase of the effective tax rate by 0.06 in the subsidiary country has a positive 'international' effect on leverage in the subsidiary country of 0.4%".

161. Weichenrieder (2015) describes the growing literature on rules limiting the deductibility of interest, including studies of German inbound FDI (Weichenrieder & Windischbauer (2008) and Overesch & Wamser (2010)); German outbound FDI (Buettner et al. (2012)), and U.S. outbound FDI (Blouin et al. (2014)). Two papers evaluated the German interest barrier rule introduced in 2008, which limits the

deductibility of interest generally to 30% of EBITDA. Using the DAFNE database for German companies, Buslei and Simmler (2012) consider how the rule affected firms' capital structure, investment and profitability. The results show a strong behavioural response by firms to avoid the limited deductibility of interest expenses, successfully broadening the tax base in the short-term. Affected firms decreased their debt-to-assets ratios and there was no evidence of a negative (short-term) effect on investment. Dreßler and Scheuering (2012) analysed how German firms subject to the interest barrier rule adjusted their debt-to-assets ratios and their net interest payments compared to a control group. Their analysis shows that the interest barrier resulted in firms lowering their debt-to-assets ratios and their net interest payments, but principally by reducing external debt rather than related party debt.

Prevent Treaty Abuse (Action 6)

162. Empirical analyses of tax treaty issues are limited and often are included with other BEPS behaviours or are specific to particular countries. One recent simulation analysis, van 't Reit and Lejour (2014), shows the potential reduction in withholding taxes due to treaty shopping, but the analysis is not based on actual taxpayer behaviour.

163. The analysis examines bilateral tax rates on cross-border dividends between 108 countries (3,244 country pairs) and shows that indirect routes (treaty shopping) are cheaper than direct routes for 67% of the country pairs. 21% of the country pairs have a zero effective tax rate without treaty shopping, but 54% when treaty shopping is possible. Treaty shopping is estimated to reduce the withholding effective tax rate by more than 5 percentage points from nearly 8% to 3%. A simulated removal of tax havens from any double tax relief (other than foreign tax credit) shows an increase in the world average effective withholding tax rate by 0.14 percentage points.

Assure that Transfer Pricing Outcomes are in Line with Value Creation (Actions 8-10)

164. Transfer pricing has been identified as a major BEPS issue with four actions identified in the BEPS Action Plan specifically dedicated to addressing BEPS through this channel. Transfer pricing, particularly through the shifting of intangible assets, is discussed in the general BEPS analyses. Four key studies focus specifically on transfer pricing.

165. Clausing (2003) investigates the effect of host country statutory and effective tax rates on inter-company trade in goods. Using data on intra-firm transactions from the US Bureau of Labor Statistics, the analysis finds that low foreign statutory tax rates are correlated with lower export prices and higher import prices relative to third-party transactions. The analysis finds a "tax rate 1% lower in the country of destination/origin is associated with intra-firm export prices that are 1.8% lower and intra-firm import prices that are 2.0% higher, relative to non-intra-firm goods". Several other studies using price-based comparisons of related-party and third-party imports and exports show significant tax effects, including a recent study of French 1999 trade data by Davies et al. (2014).

166. Grubert (2003) analysing data from US MNEs' tax returns for US MNEs finds that US controlled foreign corporations (CFCs) located in countries with relatively low and relatively high statutory CIT rates engage in significantly greater volumes of inter-affiliate transactions. This is consistent with BEPS related activity. The analysis finds that R&D intensive companies engage in greater volumes of such intra-company trade.

167. Mutti and Grubert (2009) analyse US MNEs' tax return data to investigate whether the US "check-the-box" regulation has encouraged the relocation of intangible assets abroad. They provide evidence of a substantial migration of intangible assets abroad, in particular to low tax countries through hybrid entities and cost-sharing agreements. Moreover, descriptive statistics show that royalty payments

among foreign affiliates increased sharply in the period considered, from entities in high-tax countries to entities in low-tax countries.

168. Karkinsky and Riedel (2012) focus on the effect of statutory tax rates and other tax-related variables (such as binding CFC rules and withholding tax on royalties) on the number of MNEs' patent applications. They build a unique dataset of European firms merging Amadeus financial statement database with PATSTAT information. They find that low tax rates increase the probability that the firm applies for a patent in low-tax locations. This result is similar to a study by Griffith, Miller and O'Connell (2011).

Benefits of Better Disclosure (Actions 11, 12 and 13)

169. Hoopes (2015) provides a survey of a number of studies that have analysed the effects of disclosure issues. A paper by Dyreng, Hoopes and Wilde (2014) finds empirical evidence suggesting that public companies decreased tax avoidance and reduced the use of subsidiaries in tax haven countries when there was increased public disclosure.

170. Announcements of future legislative changes can affect corporate taxpayer behaviours even before specific legislative measures have been enacted. Some corporations are already changing their international tax structures due to the progress of the BEPS Project and expected changes by governments. These changes may be reflected in surveys of MNEs and their advisers.

Fiscal estimates of enacted BEPS-related countermeasures

171. The empirical literature also includes individual country government fiscal estimates of prior legislation addressing different BEPS channels. In most cases, the fiscal estimates are ex ante estimates made at the time of the legislative enactment, rather than ex post analyses of the enacted legislation, and may not include behavioural effects. In several countries, recent limitations on excessive interest deductions were estimated to increase corporate income tax revenues by 3-9 percent. A number of countries do not estimate the fiscal effects of "base protection" measures, since they are intended to preserve existing revenue rather than to increase revenue above prior projections. This is another example of the key issue of what the "counterfactual" comparison should be. If the BEPS-type countermeasure is not enacted, then the revenue base would not be protected and revenue would decline. Once the projected revenue is reduced for the uncorrected BEPS problem, then countermeasure legislation would result in higher revenue. Under either scenario, BEPS countermeasures are important for ensuring corporations reduce their BEPS-related tax planning activities through artificial arrangements which separate taxable income from where the value is created.

BEPS and Developing Countries

172. Due to limitations of the available data, both in terms of quality and quantity, as noted in Fuest and Riedel (2010), empirical research of profit shifting in developing countries is quite limited. Attempting to fill the gap on developing country studies of BEPS, Fuest, Hebous and Riedel (2011) empirically examine income shifting from developing countries by focusing on related party loans. Distinguishing between German MNE affiliates in developed and developing countries, the results show that related party debt in developing countries is significantly more sensitive to changes in corporate tax rates than in developed countries. The study concludes that profit shifting is about twice as large in developing countries as in developed economies. The IMF (2014) study on international tax spillovers uses a rough comparison of corporate tax efficiency, which suggests that revenue losses as a percent of CIT revenues in developing countries could be several multiples of those in developed countries, due to weaker enforcement resources.

173. Many studies focusing on developing countries do not separate the revenue lost from BEPS behaviours from individual tax evasion and illicit financial flows. Developing countries have higher ratios of CIT to GDP, so their revenue base is potentially more at risk from BEPS behaviours than developed countries, and loss of CIT revenue could lead to critical underfunding of public investment that could help promote economic growth. In a report by the African Tax Administration Forum (ATAF), African tax administrations find that transfer-pricing abuse is a major obstacle not only to effective revenue mobilisation, but also to development and poverty alleviation, and that most countries lack the necessary skills to identify and analyse complex cases.[28] Better understanding of the economic effects of BEPS on developing countries is important for the design of tax policies that account for country differences in tax systems and levels of enforcement capabilities.

IV. Other Economic Impacts of BEPS and Countermeasures

174. Action 11 will also include analysis of the economic impact of BEPS and BEPS countermeasures. The scale of BEPS, in terms of the fiscal effects on government revenues, is important, but there are many other economic effects of BEPS. These include the effects on economic efficiency and growth, different types of investments and capital structure, competition among companies, competition between countries (spillover effects), and the burden of BEPS and BEPS countermeasures, among other potential effects. The final Action 11 report will synthesise the available empirical analyses from academics, think tanks, government organisations, non-government organisations, and other international economic agencies, including the IMF's recent report on international tax spillovers, and some on-going OECD analysis.

175. Another dimension to the scale of BEPS is the question of "How widespread is BEPS activity among corporations?" A number of studies have found evidence that profit shifting is widespread across the corporate MNE sector, but several recent papers (Davies, 2014; Egger et al., 2014) report significant BEPS behaviours by a limited number of large MNEs with affiliates in a small number of jurisdictions. The answer to this question has implications for the design of BEPS countermeasures. Another aspect is the dynamic nature of BEPS. Even if BEPS is not widespread now, it could become much more widespread if nothing is done on an internationally-coordinated basis. Competitive pressures through pricing and acquisitions give MNEs using BEPS an advantage in lower costs to take market share from companies that do not use BEPS to lower their costs. As seen recently in the case of corporate inversions, a significant change in corporate tax behaviour minimising taxes can occur suddenly even when legal arrangements under current law had existed for years.

176. Economic efficiency and growth are critically important to all countries. The OECD's *Tax Policy Reform and Economic Growth* (2010) ranked corporate income tax as the least conducive tax to economic growth. Some have expressed concern that BEPS countermeasures would increase effective corporate tax rates on some MNEs, with adverse economic effects resulting. The BEPS project proposes structural tax reforms that close unintended interactions of different country tax rules with internationally-coordinated rules. Any additional corporate tax revenue from BEPS countermeasures would enable the lowering of tax rates on MNEs and other taxpayers, if the specific tax effects on economic growth are a concern. In addition, corporate tax revenue reductions as a result of BEPS behaviours by a self-selected group of MNEs are likely to have different growth and efficiency implications than a reduction in corporate tax revenue resulting from a general reduction in the corporate tax rate, but this has not been a focus of existing empirical studies.

177. Economic efficiency effects can be reflected in a number of different ways. Many countries report backward-looking ETRs which vary significantly across different industries due to tax rules which are used more by certain industries, such as accelerated depreciation or research and development tax credits, or which have special industry tax rules. Tax revenue reductions from BEPS are also likely to vary

from industry to industry. For example, the ability to move intangible assets and the income associated with intangible assets without changing the location of where the value was created is a significant source of BEPS and is likely to occur in some industries more than others. This can create economic distortions across industries from varying ETRs. MNEs can take advantage of both domestic tax planning and BEPS to lower their effective tax rates below domestic competitors, providing them with an advantage in gaining market share through lower consumer prices or their ability to acquire domestic companies. Several studies, including one by Egger et al. (2010), compare income tax payments of MNEs or their affiliates with comparable domestic corporations or their affiliates. Identifying comparable MNE and domestic-only companies is a challenge, particularly for smaller countries, but statistical techniques, such as propensity score matching and regression analysis, have been used.

178. Economic efficiency is also affected by BEPS effects on MNEs' capital structure, foreign direct investment (FDI), and location of patents. A number of studies show BEPS occurring through excessive interest deductions, particularly through related party debt. As interest deductions are taken in high-tax rate countries, and the related party interest income is in low or no-tax countries, the after-tax cost of debt is reduced. Differences in the tax treatment of debt and equity can be exploited in the cross-border context and add to the tax-induced bias towards corporate debt financing. Numerous studies also show that BEPS affects the location of FDI and patents, since taxable income can be segregated from where the value is created. This can affect the location of some employment and physical capital to justify claims for the desired tax treatment.

179. Several observers have commented on how corporate income tax (CIT) revenues as a percentage of GDP for OECD countries are the same in 2012 as they were in the late 1990s, despite lower statutory corporate tax rates and increasing concerns about BEPS. As noted in Chapter 1, BEPS affects both reported CIT revenues and recorded GDP, so it is not possible to identify BEPS from aggregate national account ratios. CIT revenues as a percentage of GDP have been quite volatile across time, as well as across OECD countries over the past 15 years. Many countries have expanded their corporate tax bases to help finance lower statutory tax rates, but some of those base expansions, such as reducing accelerated depreciation, represent temporary timing differences, which may mask other trends and affect future CIT revenues (see for example, Australian Parliamentary Budget Office (2014)) Developing countries rely more heavily on CIT revenues as a percentage of GDP than OECD countries, and that reliance has doubled over the past 14 years.

180. Concerns have been expressed about the administrative cost of potential BEPS countermeasures. Tax policy changes affect taxpayer compliance costs as well as tax administrations' costs. Initial administrative costs involving one-time implementation costs are typically much larger than future on-going costs. As noted previously, an important consideration in evaluating administrative costs associated with the implementation of BEPS countermeasures is the counter-factual against which the comparison is made (i.e. the world without the BEPS project. Would the current tax rules remain unchanged (and thus compliance costs would increase), or would individual countries enact unilateral and uncoordinated BEPS countermeasures? In the latter case, internationally coordinated BEPS countermeasures could potentially reduce taxpayer compliance costs (compared to what they would otherwise be).

181. Reductions in corporate income tax revenues due to BEPS behaviours of some MNEs must be offset either through higher taxes on other businesses and households; lower government spending that affects households and businesses and economic growth; or an increase in a country's deficit, which also affects households, businesses and economic growth. In contrast, BEPS countermeasures will increase the effective tax rate of MNEs engaging in BEPS, while enabling governments to lower taxes on other sectors of the economy. Although the incidence of corporate taxes is still widely debated, most analyses conclude that corporate income tax falls on both capital and labour, varying in the degree of capital mobility, openness of the economy, and the extent to which the corporations are earning competitive returns or

economic rents. Since BEPS is not a general CIT rate reduction, but a self-selected tax reduction of some MNEs, the burden of BEPS countermeasures would not be the same as the burden of a general corporate tax policy change.

182. It will be important to account for taxpayer behaviours that could offset the potential positive gains, particularly if the BEPS countermeasures are not adopted by most countries or if there are other tax avoidance mechanisms not addressed by the BEPS countermeasures to which MNEs could avail themselves.

183. The fiscal and economic impact of BEPS and BEPS countermeasures are important, and initial estimates based on currently available data, tools and methodologies are helpful to policymakers. Additional new analysis is being undertaken simultaneously with the BEPS project, but there are still many unanswered questions and the need for additional available data and analysis.

Questions for consultation

- Are there any alternatives to the two approaches (aggregate tax rate differential and BEPS channels) for measuring the scale of BEPS?

- Are there recommended approaches for extrapolating from studies based on a non-random sample of MNEs, from individual countries or limited countries, to a global estimate?

- Are there other important empirical studies about the scale or economic impact of BEPS and/or the Action Items which are not included in the reference listing?

- Are there additional empirical studies about the effects of BEPS in developing economies? What would an ideal economic analysis of the scale of BEPS include – data, dependent variable, tax variable, independent variables?

- Are there other analyses of BEPS that governments' tax administrations or tax policy offices might consider with currently available data?

- Would internationally-coordinated BEPS countermeasures increase or reduce taxpayer compliance costs relative to your expectation of future country tax rules in a world without the BEPS project, and what would be the key determining factors?

- Are there studies of the cost of compliance with international tax rules, and do any of them estimate the cost of complying with non-internationally coordinated tax rules?

- Are there any studies that estimate the costs of MNE international tax planning?

- Are there additional empirical studies on the competition issue between companies and on the competition (spillovers) issue between countries?

- Are there empirical studies that analyse whether reductions in ETRs from BEPS behaviours have different economic effects (e.g., efficiency, incidence, welfare) from general reductions in ETRs from legislated policy changes?

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ABBREVIATIONS AND ACRONYMS

AETR – Average effective tax rate

BEA – US Bureau of Economic Analysis

BEPS – Base erosion and profit shifting

BOP – Balance of Payments

BvD – Bureau van Dijk

CDIS – Coordinated Direct Investment Survey (IMF)

CFA – OECD Committee on Fiscal Affairs

CFC – Controlled foreign company

CIAT – Inter-American Centre of Tax Administrations

CIT – Corporate income tax

EBITDA – Earnings before interest taxes depreciation and amortization

ECLAC – Economic Commission for Latin America and the Caribbean

ECJ – European Court of Justice

EITI – Extractive Industries Transparency Initiative

ETR – Effective tax rate

EPO – European Patent Office

FDI – Foreign direct investment

FL-ATR – Forward-looking average effective tax rates

FL-METR – Forward-looking marginal effective tax rate

GAAP – Generally Accepted Accounting Principles

GDP – Gross domestic product

GFS – IMF Government Finance Statistics

IBD – Inter-Development Bank

ICTD – Sussex University International Centre for Tax and Development

IDS – Sussex University Institute for Development Studies

IFRS – International Financial Reporting Standards

IMF – International Monetary Found

IP – Intellectual property

IRS – US Internal Revenue Service

LAC – Latin American and Caribbean (countries)

MiDi – German Bundesbank micro database on direct investment

MNE – Multinational enterprise

MTR – Marginal tax rate

NA – National Accounts

NGO – Non-government organisation

NSO – National statistical office

OECD - Organisation for Economic Co-operation and Development

R&D – Research and development

SPE – Special purpose entity

STR – Statutory tax rate

ENDNOTES

[1] IMF (2014), Coordinated Direct Investment Survey: Project on bilateral asymmetries

[2] For financial accounting purposes, the objective is to record both current-year and future-year tax liabilities (tax expense) associated with the current-year economic activities of a firm. This differs from actual, current-year tax payments that may have been generated by prior-year economic activities and do not include the future tax payments from current-year economic activities. See Hanlon (2003) and Lip

[3] Koch, R. & Oestreicher, A. (2014), in response to the OECD BEPS Action 11 Request for Input.

[4] Prichard, Cobham and Goodall (2014).

[5] Hope et al. (2013) examined firms' responses to a US accounting rule change in 1998, which allowed firms to stop providing segment reporting at the geographic level. The analysis found that firms that discontinued geographic segment reporting were those that had lower effective tax rates, consistent with firms' interest innot reporting information that would potentially reveal tax avoidance behaviour. In a similar paper, Akamah et al. (2014) find that firms with operations in tax havens are more likely to aggregate their geographic segment disclosures.

[6] Cobham and Loretz (2014) use the largest commercially available database of company balance sheets, Orbis. Using a dataset of over 200,000 individual companies in over 25,000 corporate, they state coverage is severely limited among developing countries, and increasingly so for lower-income countries, and "where there are non-random reasons for information to be missing (e.g. accounts in low-tax jurisdictions are less likely to be included in the dataset), this will result in systematic biases to the results."

[7] In response to the OECD (2014) BEPS Action 11 Request for Input, Reinald Koch and Andreas Oestreicher list some of the limitations: there is no distinction between interest and dividend income, or between intra-group and third party transactions; the publishers of the data rely on extent to which companies publish reports; there are missing companies in the data as well as missing financial information from companies that are included; it is not a random sample as it depends on information released by business sector; and it can be assumed that information is lacking in particular for entities that are used for tax planning purposes.

[8] Beer and Loeprick (2013) estimate profit shifting, and find significant effects, but note the selection criterion reduced their sample by more than 60 percent, "possibly resulting in a bias as incomplete accounting information may be correlated to less transparent corporate governance and more aggressive tax optimization." "Such a bias would likely result in an underestimation of findings on aggregate profit shifting."

[9] Commons Select Committee on Tax avoidance and evasion in the UK (2015); The Permanent Subcommittee on Investigations in the US (2013) ; Inquiry into Tax Disputes in Australia (2014); and the European Commission (2014).

[10] OECD, 2014. OECD Expert Group for International Collaboration on Micro Data Access: Final Report

[11] Prichard, Cobham and Goodall (2014).

[12] e.g. Markle & Shakelford (2012).

[13] e.g. Weyzig (2014), Buettner and Wamser (2007), Huizinga et al. (2008).

[14] See e.g. Cobham & Loretz, (2014).

[15] See Weyzig (2014).

[16] References to the "future state" and "ideal state" are not presented as proposed or inevitable stages, but are designed to highlight that improvements in the data sources available would also lead to improvements in the accuracy of BEPS indicators and economic analyses.

[17] The firm-level financial information is for a sample of the 250 largest global MNEs, as measured by sales. It includes financial information in 2007 and 2011 from both the MNE consolidated and affiliates' unconsolidated financial statements.

[18] The tax expense measure includes taxes that are based on income, including corporate income taxes and withholding taxes based on income.

[19] Indicators 2 and 3 measure potential profit shifting in different ways. Indicator 2 uses individual affiliate observations in the calculations; Indicator 3 aggregates all of a MNE's affiliates at the country level. The two indicators also differ in how low-tax locations are defined. Indicator 2 defines low-tax as locations of affiliates with ETRs less than the MNE group's worldwide ETR; Indicator 3 defines low-tax as countries with the lowest ETRs accounting for 20% of assets.

[20] Domestic operations include the parent company and its affiliates operating in the same country as the parent.

[21] The use of a propensity score to identify comparable domestic and MNE firms is used by P. Egger, W. Egger, and H. Winner, "Saving Taxes Through Foreign Plant Ownership, *Journal of International Economics*, 81, 2010 (pp. 99-108).

[22] Research and development expenditures include current plus capital expenditures (both public and private) for R&D activities performed within a country. Royalty receipts are payments for the use of intellectual property that may not be directly related to the measure of R&D spending.

[23] EBITDA is pre-tax income before any deductions for interest paid, corporate income taxes, depreciation and amortization. Net interest expense (interest expense minus interest income) could not be calculated from the available affiliate-level data.

[24] The total assets accounted for by low-tax countries, will not be exactly 20%. In that case, the last country to be included in the low-tax countries would cause the sum of low-tax countries' assets exceed 20% of total MNE's assets. The last country is then not assigned a weight equal to its assets. Instead, it is assigned a lower weight. This weight is set such that the sum of assets of all low-tax countries is equal to exactly 20% of the sum of total MNE's assets. For example, the two low-tax countries are A and B. A has an ETR of 11% and assets equal to 15% of total MNE's assets; B has an ETR of 12% and assets equal to 10% of total MNE's assets. In that case, B is assigned a weight of half of its assets equal to 5% of total MNE's assets (15% + 5% = 20%).

[25] Several of the studies referred to later in the chapter describe the effects of some existing BEPS counter-measures, including interest limitations. Several countries reported in the survey by the OECD CFA Working Party No.2 revenue from interest limitations ranging from 3-9% of corporate income tax revenues.

[26] OECD (2010), *Tax Policy Reform and Economic Growth.*

[27] Slemrod and Wilson (2009) and Dharmapala (2014).

[28] Monkam, N. (2012)