

GSS/ISODEC TRAINING FOR GHANA, LIBERIA, NIGERIA ND SIERRA LEONE

ASSET AND INTELLECTUAL PROPERTY SHIFTING

What is Asset and intellectual property shifting?

- Multinational enterprises (MNEs) may shift assets and intellectual property (IP) from one country to another for various reasons, including tax planning, regulatory requirements, and market access
- It's worth noting that not all asset and IP shifting by MNEs is illegal or improper. Many MNEs engage in legitimate tax planning activities that are within the bounds of the law. However, some MNEs may engage in abusive tax practices that are designed to evade taxes or take advantage of loopholes in the law.
- It's important for countries to monitor the financial activities of MNEs to ensure that they are paying their fair share of taxes and not engaging in abusive practices.
- Here are some common methods that MNEs may use to shift assets and intellectual property:
 1. **Transfer pricing:** MNEs may manipulate the prices at which they transfer goods or services between related companies in different countries to shift profits from high-tax to low-tax jurisdictions.
 2. **Debt financing:** MNEs may use debt financing to shift profits to low-tax jurisdictions by paying interest on loans to related companies in those jurisdictions.
 3. **Royalty payments:** MNEs may shift profits to low-tax jurisdictions by paying royalties on IP to related companies in those jurisdictions.
 4. **Licensing:** MNEs may transfer IP ownership to subsidiaries in low-tax jurisdictions and then license the IP back to subsidiaries in higher-tax jurisdictions to shift profits.
 5. **Intangible asset transfers:** MNEs may transfer ownership of intangible assets, such as patents or trademarks, to subsidiaries in low-tax jurisdictions to shift profits.

What Methods Do MNEs Use?

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How Do We Measure and Monitor MNEs in this area?

- Measuring and monitoring asset and intellectual property shifting by multinational enterprises (MNEs) can be a complex and challenging task.
- There are several factors that can impact the accuracy of these measurements, including changes in company structure, variations in accounting methods, and differences in legal systems.
- There are some general methods and techniques that can be used to measure and monitor asset and intellectual property shifting by MNEs.
- One common approach is to analyze the financial statements of MNEs, such as their balance sheets and income statements, to identify any changes in the value of their assets and intellectual property

Steps for measuring and monitoring MNEs in this areas

- 1. Gather financial data:** Collect the financial statements of the MNEs you are interested in analyzing. You may be able to find this data on the company's website or through financial databases such as Bloomberg or Reuters.
- 2. Import the data:** Use Pandas to import the financial data into your Python environment. This will allow you to manipulate the data and perform calculations.
- 3. Calculate changes in asset values:** Use NumPy to calculate changes in the value of the MNE's assets over time. You may want to consider using percentage changes to account for differences in the size of the MNE.
- 4. Identify shifts in intellectual property:** Analyze the MNE's financial statements to identify any changes in the value of their intellectual property. This could include patents, trademarks, and copyrights.
- 5. Visualize your findings:** Use Matplotlib or Seaborn to create visualizations of your findings. This could include line charts showing changes in asset values over time or bar charts showing changes in the value of different types of intellectual property.
- 6. Interpret your findings:** Finally, analyze your findings to identify any patterns or trends. This may require further research and analysis to determine the reasons behind any shifts in asset or intellectual property values.

What Model can we Use to monitor MNEs in this area?

1. **Gather data:** Collect financial data on MNEs operating in the country. This could include data on their assets, intellectual property, and revenue.
2. **Preprocess the data:** Use Python libraries such as Pandas and NumPy to preprocess the data. This may include cleaning the data, transforming variables, and creating new features.
3. **Build the model:** Choose a machine learning algorithm to build your model. You may want to consider using a classification algorithm such as logistic regression or random forest, which can predict whether an MNE is likely to engage in asset or intellectual property shifting.
4. **Train the model:** Split your data into training and testing sets and use the training set to fit your model.
5. **Evaluate the model:** Use the testing set to evaluate the performance of your model. You may want to consider using metrics such as accuracy, precision, and recall to measure the model's performance.
- **Deploy the model:** Once you are satisfied with the performance of your model, deploy it to monitor the financial activities of MNEs operating in the country. You may want to consider integrating the model into a larger system that can automatically flag any suspicious activity for further investigation

GSS/ISODEC IFFs TRAINING FOR Ghana, Liberia, Nigeria and Sierra Leone-March-2023

Base Erosion And Profit-Shifting-what should Africa's
response be to the OECD BEPS Action Plan?

(Bishop Akolgo (based on Oguttu, 2015))

WHAT ARE BASE EROSION AND PROFIT-SHIFTING-BEPS?

- base erosion and profit shifting' (BEPS) refers to 'tax avoidance 'by multinational enterprises (MNEs) that use gaps in the interaction between different tax systems to reduce taxable income artificially, or shift profits to low-tax jurisdictions in which little or no economic activity is performed.
- The (OECD) issued a report in 2013 in which it noted that: 'BEPS constitutes a serious risk to tax revenues, tax sovereignty and tax fairness for OECD member countries and non-members alike.
- This prompted it to come up with a 'Fifteen Point BEPS Action Plan' which is intended to ensure that profits are taxed where the economic activities generating those profits are performed and where value is created.

FREEDOMS OF TAX PAYERS AND POOR NATIONS

- To curtail tax avoidance, the practice in question has to be prevented through anti-tax avoidance provisions in domestic tax laws, double tax treaties, and through countries adhering to international initiatives and recommendations against tax avoidance, such as those in the OECD 15 Point BEPS Action Plan (BEPS Action Plan 15).
- The term 'tax avoidance' must be distinguished from the term 'tax evasion', which is illegal and entails the non-compliance with the tax laws and includes activities (like the falsification of tax returns and books of account) that are deliberately undertaken by a taxpayer to free itself illegally from the tax which the law charges upon its income.

TAX AVOIDANCE THE LAW AND MORALITY

- Historically, the courts have held that there is no morality when it comes to paying taxes. This was confirmed by Lord President Clyde in the UK case of *Ayrshire Pullman Motors Services and D M Ritchie v IRC* 11
 - [n]o man in this country is under the smallest obligation, moral or otherwise, to arrange his legal relations to his business or to his property so as to enable the Inland Revenue to put the largest possible shovel into his stores. The Inland Revenue is not slow – and quite rightly – to take advantage, which is open to it under the taxing Statutes for the purpose of depleting the taxpayer's pocket. The taxpayer is in the like manner, entitled to be astute to prevent, so far as he honestly can, the depletion of his means by the Revenue.
- Lord Tomlin also held in the celebrated case of *Duke of Westminster* as Follows:
 - [e]very man is entitled if he can to order his affairs so that the tax attaching under the appropriate Act is less than it otherwise would be. If he succeeds in ordering them so as to secure this result, then, however inappropriate to the Commissioner of Inland Revenue or his fellow taxpayers may be of his ingenuity, he cannot be compelled to pay an increased tax.

CURRENT STATE OF OPINION ON TAX AVOIDANCE

- Even though tax avoidance is not illegal, over the years it has been frowned upon by the courts and by tax authorities as the resultant loss of tax revenue has the effect of limiting a government's ability to pursue its economic and social objectives.
- Indeed, the morality of tax avoidance was questioned years back in *Re Weston's Settlements*, where Lord Denning made a characteristically terse admonition that 'the avoidance of tax may be lawful, but it is not yet a virtue'.
- In *CIR v McGuckian*,¹⁶ Lord Steyn remarked that the Duke of Westminster notion that a taxpayer is free to arrange its financial affairs as it thinks fit, had 'ceased to be canonical' as to the consequences of a tax avoidance scheme.
- And in the New Zealand case of *Elmiger v CIR*, it was held that the ingenious legal devices contrived to enable individual taxpayers to minimise or avoid their tax liabilities are often not merely sterile or unproductive in themselves (except perhaps in respect of their tax advantages for the taxpayer concerned), but that they have social consequences which are contrary to the general public interest.

PREVIOUS ATTEMPTS TO CURTAIL BEPS

- In an attempt to lessen their global tax exposure, MNEs have increasingly used global tax avoidance strategies to maximise profits while their links to any country with a favourable tax climate have become more tenuous.
- In response, countries have enacted various anti-avoidance measures to curtail these tax avoidance strategies – taxpayers, however, are usually one step ahead.
- The cycle of continuous amendment to close loopholes in tax legislation has complicated most countries' corporate income tax provisions without, however, preventing well-advised taxpayers from aggressively avoiding domestic taxes by keeping their income in low-tax jurisdictions.

CONDUCT OF INDUSTRIAL NATIONS

- For many years the OECD and EU failed to acknowledge that their companies were giving both they and developing countries a raw deal, especially in supporting or closing eyes to tax heavens
- As the growth of tax havens continued to be a major cause of the depletion of countries' tax bases, from the early 1990s the international community began to take measures to stifle their development.
- The European Union (EU) issued a report containing recommendations on company taxation in Europe that would prevent residents of member countries from transferring investments to other member countries that levied lower taxes.
- Since then the EU has issued various directives to prevent the depletion of its members' tax bases

CSOS AND THE TAX JUSTICE CAMPAIGN

- In the aftermath of the 2007/8 global financial crisis, concerns about MNE not paying their fair share of taxes again took centre stage, engineered by non-governmental organisations like Christian Aid⁴⁰ and the Tax Justice Network,⁴¹ which voiced public concerns about companies paying little or no corporation tax in the countries in which they conduct business.
- At the 2012 G20 summit in Mexico, the national leaders explicitly referred to the need to prevent BEPS and, at the behest of the G20, in February 2013 the OECD released its BEPS Report
- BEPS is enabled by the fact that the current international corporate taxation framework has not kept pace with the changing business environment.
- Domestic rules for international taxation and internationally agreed standards remain grounded in an economic environment characterised by a lower degree of economic integration across borders, rather than today's environment of global taxpayers, which is characterised by MNE companies that are increasingly placing importance on intellectual property as a value-driver and the development of information and communication technologies.

IMPORTANCE OF CORPORATE TAX IN AFRICA

- Corporate tax system is a very important source of revenue in African countries and must be retained.
- While in OECD countries corporate tax does not represent an important source of revenue, this is not true of developing countries where it generally contributes more than 25 per cent of total revenue. In Africa, the continental average is 29 per cent of total revenue.
- Unlike in developed countries which derive reasonable amounts of revenue from individual income and consumption taxes, in many developing countries domestic economic activity is informal through businesses which maintain few if any bookkeeping and financial records.
- As a result, developing country governments' ability to raise revenue from individual and consumption taxes is limited.

BEPS AND CAPITAL FLIGHT IN AFRICA

- The problem of capital flight in Africa falls under two main categories: legitimate capital flight and illicit capital flight.
- Global Financial Integrity' notes that 'Illicit financial flows are by far the most damaging economic problem facing Africa' and are considered the 'most pernicious global development challenge of our time'
- There is no universally agreed definition of illicit financial flows and its boundaries are disputed. The term generally implies the movement of money in a way that contravenes the laws or regulations of a country. These money movements can be the result of illegal activities like tax evasion, organised crime, customs fraud, money laundering, terrorist financing, and bribery.
- However, some controversial definitions include in illicit financial flows certain corporate tax avoiding practices, such as BEPS despite their being legal

BEPS IN AFRICA

- African countries have been victims of this practice for decades, with their residents shifting money to developed countries and tax haven jurisdictions.
- The loss of tax revenue resulting from BEPS leads to critical under-funding of public investment that could help promote economic growth.
- It also impacts negatively on badly needed finances to fund public infrastructure such as roads, hospitals, and schools. BEPS undermines the integrity of the tax system.
- It discourages tax morality and encourages a perception that the tax system is unfair.
- This, in turn, undermines voluntary compliance by all taxpayers. It also undermines competition as MNEs enjoy a competitive edge over enterprises that operate at domestic level, especially small and medium-sized enterprises.

THE RELEVANCE OF THE OECD BEPS PROJECT TO AFRICA

- The OECD 2013 BEPS Action Plan notes that in order to ensure international consensus in addressing BEPS, it would take into account the perspectives of developing countries.
- However, criticism has been raised that the OECD agenda is driven by the interests of developed countries and that the interests of developing countries are not being addressed as they were not consulted as to tabling their concerns before the OECD 15 Point Action agenda was drafted and closed.
- The OECD's initial regional consultations only served as orientations to a pre-existing plan which fell short of global equal participation in the formulation of the international tax reforms.
- Its BEPS Action agenda is criticised for embodying rules set by a few countries so reinforcing a system that exacerbates global inequality

OTHER CONCERNS OF AFRICAN COUNTRIES

- The OECD's approach has also been criticised for not addressing fundamental international tax reforms or re-examining the basic principles of the international tax system which are pivotal in addressing BEPS, such as the allocation of tax income between residence and source countries.
- OECD chose to focus on curtailing tax avoidance schemes by strengthening existing anti-avoidance provisions, to ensure that they would be more effective in curtailing BEPS under modern business models.
- However, since taxpayers have manipulated these anti-avoidance provisions to a point at which they have become ineffective, there is little reason to expect that strengthening the rules further will prevent BEPS.
- It has therefore been suggested that the OECD's BEPS Action agenda is a reactionary approach to meet revenue demands by European countries to cover their budgetary deficits after the 2007/2008 global financial crisis which left many of them in a position of capital importers and which are now disadvantaged by the international tax rules that were crafted to suit them.
- Now that damaging effects have been felt by rich countries, they have developed the political will to find solutions to the problems that developing countries have been struggling with for decades.

HOW SHOULD AFRICA RESPOND BE TO THE OECD BEPS ACTION PLAN?

- No African country is a member of the OECD, and African countries are not bound to follow OECD recommendations. Although the primary focus of the OECD is on its member countries, its additional goals of contributing to the expansion of world trade and the development of the world economy, also affect non-members.
- It would, therefore, be in the interest of African countries to respond to the OECD recommendations since BEPS is a global challenge that requires a global solution.
- All countries (including African economies) have a shared interest in strengthening the integrity of the international corporate tax system.
- Given that many African countries have large resource bases that are exploited by foreign investors, it is important that they take proactive steps to prevent BEPS.
- There has been a shift in the philosophies of some governments that encouraged the perpetuation of certain notorious tax avoidance schemes.
- For example, the Irish government has taken measures to close tax loopholes that permit the use of the 'double Irish sandwich' scheme which allowed companies registered in Ireland to be stateless and thus pay tax nowhere.

EXERCISES-MEASURING IFFS USING PARTNER COUNTRY-PCM AND PRICE FILTER-PFM METHODS

PCM

STEPS

1. Use the Tax Justice Network platform on country vulnerability, intensity and exposure to IFFs to analyse for commodities and countries of destination constituting the highest IFFs risks to your country
2. Select one commodity to measure for a year
3. Identify country of destination
4. Retrieve export data from exporting country
5. Retrieve import data from importing country
6. Compare their values
7. Adjust for transport
8. Adjust for insurance
9. Adjust for mark-up
10. Establish the threshold where you will say the difference is abnormal and thus IFF
11. Summary grand totals of inflows and outflows.

Excel Implementation of PCM:

Modeling PCM for Ghana

- I. Objectives:
 - a. Estimate the difference between country A 's reported export to its partner countries (Ghana_X.xlsx) and Partner countries' reported import from country A (Partner_M.xlsx)
 - b. Estimate the difference between country A's reported import from its partner countries (Ghana_M.xlsx) and Partner countries' reported export to country A (Partner_X.xlsx)
 - c. Identify top 10 or 20 high-risk countries with misinvoicing in export and import
- II. Data source: IMF DOTS, 2012 monthly.

Modeling steps:

I.Complication:

The list of partner countries reported by Ghana does not match the partner countries which reported having trade (export or import) with Ghana.

Illustration:

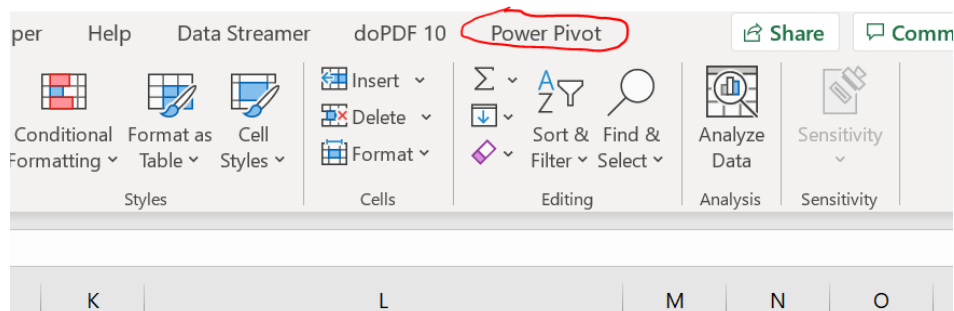
- II. Ghana's export list of partner countries: A, B, C, D
- III. List of Countries reported as having imported from Ghana: A, B, D, E.
- IV. For Country C, Ghana reported as having exported but Country C did not report any import from Ghana
- V. For Country E, Ghana has no record of having exported to E, but E reported as having imported from Ghana
- VI. To put together all the data from Ghana's export and Partners' import, we need to create a list of all countries: A, B, C, D, and E: Name the file as **PCM_Ghana_X_Analysis.xlsx** (**PCM_Ghana_M_Analysis.xlsx** for import analysis.) This file has only one column with a list of all the countries, A, B, C, D, E.
- VII. Using Power Pivot in Excel, build a model relating **PCM_Ghana_X_Analysis.xlsx** to **Ghana_X_2012.xlsx** and **Partner_M_2012.xlsx** and create calculated fields:
- Export_Over_Invoiced_amount = $\text{MAX}(0, (\text{Ghana_X} - \text{Partner_M}/1.1))$
 - Export_Under_Invoiced_amount = $\text{MAX}(0, (\text{Partner_M}/1.1 - \text{Ghana_X}))$
 - Dividing import data by a factor of 1.1 is because import data is reported as CIF while export data as FOB.

VIII. Modeling PCM using Power Pivot for Ghana Export misinvoicing

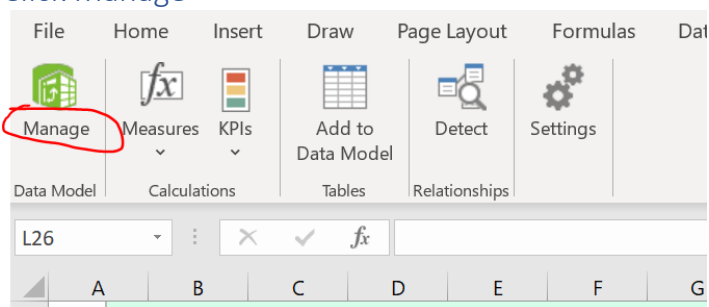
IX. Open a new Excel blank workbook. Save it as **=xlsx**

(If Power Pivot is not activated, activate Power Pivot: File > Options > Add-ins > Select "Microsoft Power Pivot for Excel" from Inactive Application Add-ins list)

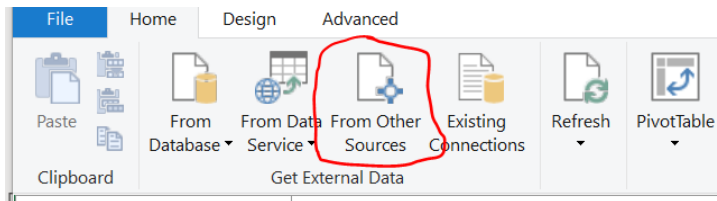
X. Click "Power Pivot" from the ribbon



XI. Click Manage



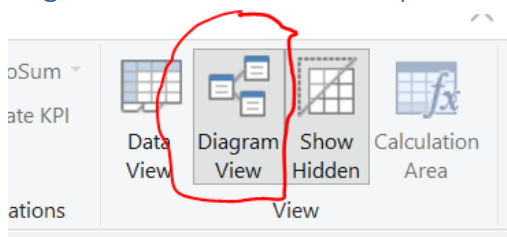
XII.To import **Ghana_X_2012.xlsx** data, select “From Other Sources” from “Get External Data” group



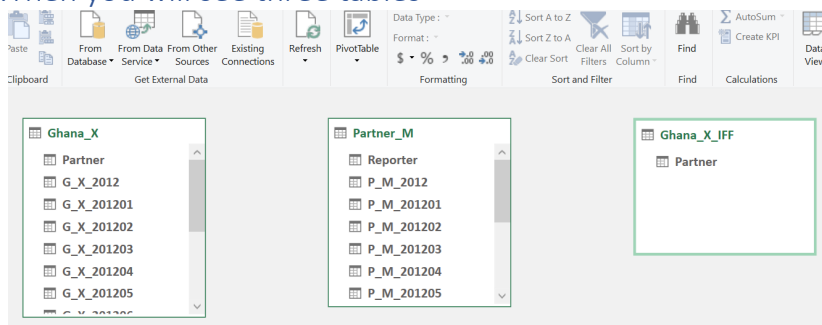
XIII.You will see a list of Relational Databases. Scroll through to the bottom of the list. Select Excel File (or Text File for importing a CSV file) > Browse > & check “Use first row as column headers” > Next > Finish (name the table as **Ghana_X**)

XIV.Repeat to import **Partner_M_2012.xlsx** (name the table as **Partner_M**) and **PCM_Ghana_X_Analysis.xlsx** (name the table as **Ghana_X_IFF**)

XV.Click “Diagram View” in View Group

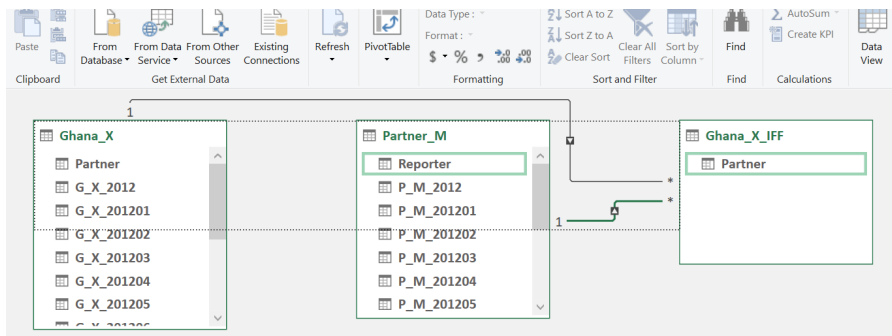


XVI.Then you will see three tables

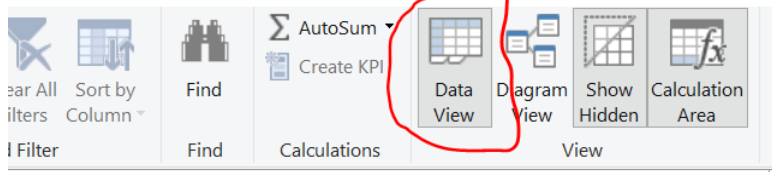


XVII.At this point, three tables are not related to each other. To model the relation between Ghana_X_IFF and Ghana_X, drag the field, “Partner” from Ghana_X_IFF to “Partner” in Ghana_X. Repeat this process for Partner in Ghana_X_IFF to Reporter in Partner_M .

XVIII.There should be lines linking tables. At the ends of the lines, a “*” should be on the side of Ghana_X_IFF table and a “1” on Ghana_X and Partner_M. This indicates one-to-many relations.



XIX. Now click “Data View” in the View group:



Pa...	Add Column
Afghanist...	
Algeria	
America...	
Angola	
Antigua a...	
Argentina	
Armenia,...	
Asia not ...	
Australia	
Austria	
Azerbaija...	

You should see a list of three tables at the bottom: Ghana_X, Partner_M, Ghana_X_IFF. Above Ghana_X_IFF, only one table heading (field name) is shown: Partner.

Inserting Calculated Fields

Double click the heading “Add Column” on the top right-hand side, and you can name a new field name to be calculated. Name it as Ghana_X. Add three more columns: Partner_X, Ghana_X_Over, Ghana_X_Under. Notice the calculated fields are highlighted in black.

Now put a formula for each calculated field:

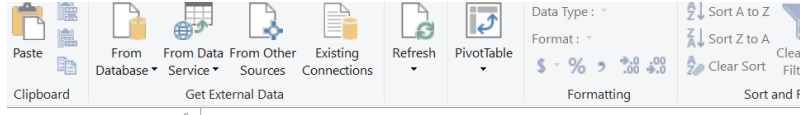
Start with Ghana_X:

- Click the heading
- Type “=” and continue type “related(” > select the field “Ghana_X[G_X_2012] > type with a closing parenthesis “)”. Notice the column will be populated with the

export data from Ghana_X table.

- Repeat the same procedure for Partner_M field, “=Related(Partner_M[_P_M_2012])”

- Now put a formula for Ghana_X_Over as:
`"=max(0,Ghana_X_IFF[Ghana_X]-Ghana_X_IFF[Partner_M]/1.1)"`

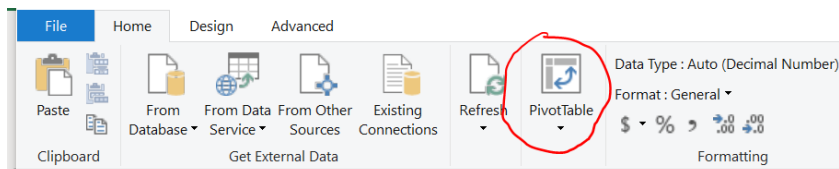


	Ghana_X	Partner_M	Ghana_X_Over	Ghana_X_Under	Add Column
1	Afghanist...	0.00065	0.00065	0	
2	Algeria	2.608016	0	2.37092363636364	
3	America...	0.044412	0.001615636363...	0	
4	Angola	4.169004	9.985931	4.90911509090909	
5	Antigua a...	88.645854	0.016493	88.6308603636364	
6	Argentina	0.003848	0.019008	0.013432	
7	Armenia,...	0.416248	0	0.378407272727273	
8	Asia not ...	0.00082	0.00082	0	
9	Australia	5.635534	7.723394	1.38573327272727	
10	Austria	0.550775	0.315060454545...	0	
11	Azerbaija...	0.0654	0	0.0594545454545...	

Record: 1 of 172

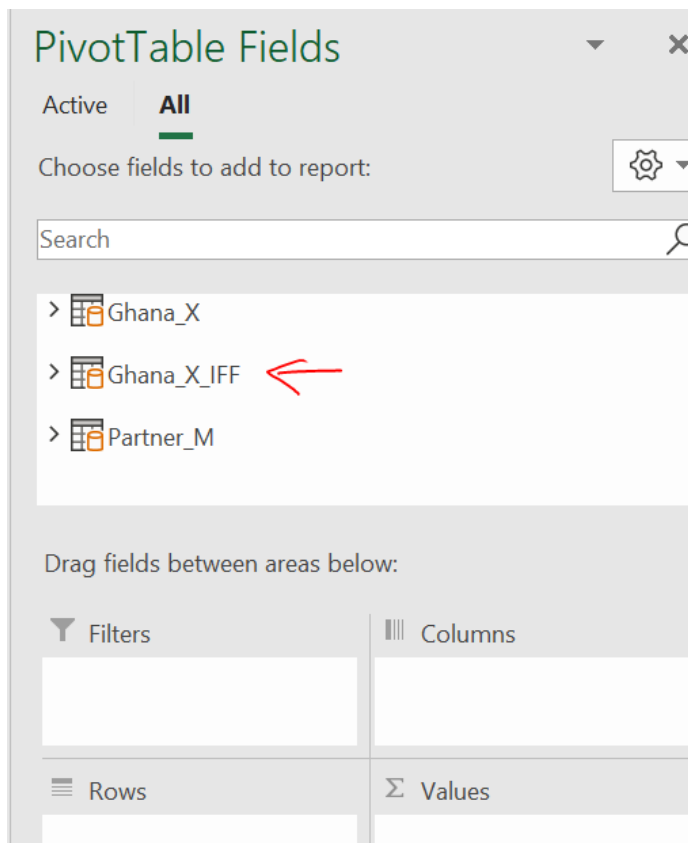
For easy reading, the numbers may be formatted as \$ with no decimals.
 This completes the Ghana's Export overinvoicing and Export under-invoicing calculation.

XX.Create Pivot Table to sort by IFF amount and identify high-risk partners



	Ghana_X	Partner_M	Ghana_X_ov	Ghana_X_un	Add Column
1	Afghanist...	0.00065	0.00065	0	
2	Algeria	2.608016	0	2.3709236363...	
3	America...	0.044412	0.0016156363...	0	
4	Angola	4.169004	9.985931	4.9091150909...	
5	Antigua a...	88.645854	0.016493	88.630860363...	

XXII.Select the field "Partner" from Ghana_X_IFF, then Ghana_X_ov, Ghana_X_un



XXIII. Select the entire pivot table and copy it.

XXIV. Paste it in a range somewhere below the pivot table: Click Home > Paste (down arrow) > Select “Values (V)” from “Paste Values” group

XXV. To find the list of top 10 (or 20) high risk countries with Export Underinvoicing, sort the table in descending order of Ghana_X_un.

XXVI. To find the list of top 10 (or 20) high risk countries with Export Overinvoicing, sort the table in descending order of Ghana_X_ov.

XXVII. Modeling PCM using Power Pivot for Ghana Import misinvoicing

For Ghana’s Import analysis, follow the same process as in “IV. Modeling PCM using Power Pivot for Ghana Export misinvoicing” and “V. Create Pivot Table to sort by IFF amount and identify high-risk partners.”

Price Filter Method-PFM

1. Use Tax Justice Network platform and analyse for the commodities and countries of destinations with the highest risks of mispricing
2. Identify one commodity you want to analyse for a year
3. Consolidate the commodity values for one year

4. Determine whether the commodity has established market price or not.
5. If commodity has established market price, then use market prices to compare with declared values by trader
6. Treat the established market price as the Arm's Length price
7. Determine the threshold values below and above this arm's length price
8. Consolidate the under-invoiced amounts for a year
9. Consolidate the over-invoiced amounts for a year
10. If there is no established market price for the commodity, then use a statistical method to estimate an arm's length price
11. Treat this as the arm's length price
12. Compare this arm's length price to the declared values
13. Determine which values are above (under-invoicing) and which are below (over-invoicing) the arm's length price
14. Consolidate under-invoiced amount for a year
15. Consolidate the over-invoiced amount for a year
16. Identify individual businesses with the highest risks
17. Identify the countries of destination for commodities with highest risks (top 10 to 20)
18. Identify commodities with the highest risks (top 10 to 20)

Excel Implementation of PFM

Modeling PFM US Export to Country A (Ghana, Liberia, Nigeria or Sierra Leone)

I. Objectives:

- a. Estimate the overinvoiced amount (amt_ov_w) and the underinvoiced amount (amt_un_w) in the U.S. export data using a US-World Price filters (upper quartile price "PUpQ" and lower quartile price "PUpQ").
 $\text{Amt_ov_w} = \text{MAX}(0, (\text{price} - \text{PUpQ}) * \text{Quantity})$
 $\text{Amt_un_w} = \text{MAX}(0, (\text{PLoQ} - \text{price}) * \text{Quantity})$
- b. Identify top 10 or 20 high-risk commodity groups (by HS10 and HS02)

II. Data source: US Merchandise Trade: Exports – Monthly (2012) Web:

<https://www.census.gov/foreign-trade/statistics/dataproducts/index.html>

XXVIII. Complication:

The US Export data (**US_Exp_toGhana2012.xlsx**) include several fields: HS10 code (commodity), country code (cty_code), quantity (all_qy1_mo), and value (all_val_mo). The commodity names are on a separate reference table (**hs10x12.xlsx**). HS02 code can be extracted from HS10, but it also needs a reference table for HS02 (**HS02.xlsx**). The price filters are on its own table (**MTX1212X_Wrld.xlsx** based on US-World trade records and **MTX1212X_Ghana.xlsx** based on US-Ghana trade records.)

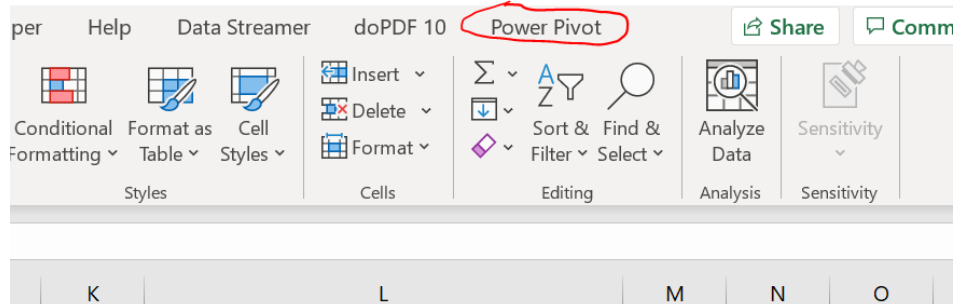
It is necessary to model relating the US Export data (**US_Exp_toGhana2012.xlsx**) table to four other tables. This requires using a relational database tool. The Power Pivot in Excel is used in this exercise. Other tools such as Microsoft SQL Server, Oracle Database, MySQL, IBM DB2, and PostgreSQL are more efficient but has significant steep learning curve compared to Excel Power Pivot.

XXIX. Modeling PFM using Power Pivot for Ghana Export misinvoicing

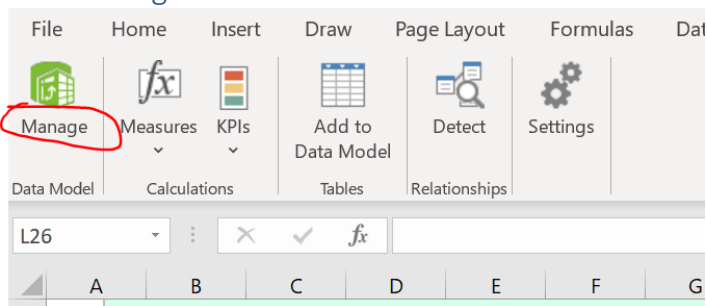
XXX. Open a new Excel blank workbook. Save it as **PFM_US_X_to_Ghana.xlsx**

(If Power Pivot is not activated, activate Power Pivot: File > Options > Add-ins > Select "Microsoft Power Pivot for Excel" from Inactive Application Add-ins list)

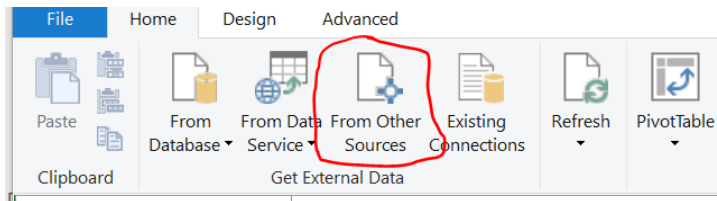
XXXI. Click "Power Pivot" from the ribbon



XXXII. Click Manage



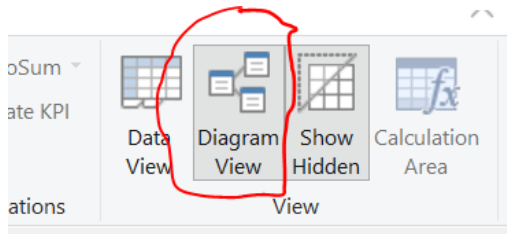
XXXIII.To import **US_Exp_toGhana2012.xlsx** data, select “From Other Sources” from “Get External Data” group



XXXIV.You will see a list of Relational Databases. Scroll through to the bottom of the list.
Select Excel File (or Text File for importing a CSV file) > Browse > & check “Use first row as column headers” > Next > Finish (name the table as **Exp12toGhana**)

XXXV.Repeat to import **MTX1212X_Wrld.xlsx** (name the table as **MTX1212X_Wrld**),
MTX1212X_Ghana.xlsx (name the table as **MTX1212X_Ghan**), **hs10x12.xlsx** (name the table as **hs10x12**), and **hs02.xlsx** (name the table as **hs02**)

XXXVI.Click “Diagram View” in View Group



XXXVII.Then you will see five tables. Link fields from tables to model/create the relations as follows:

Commodity in **Exp12toGhana**

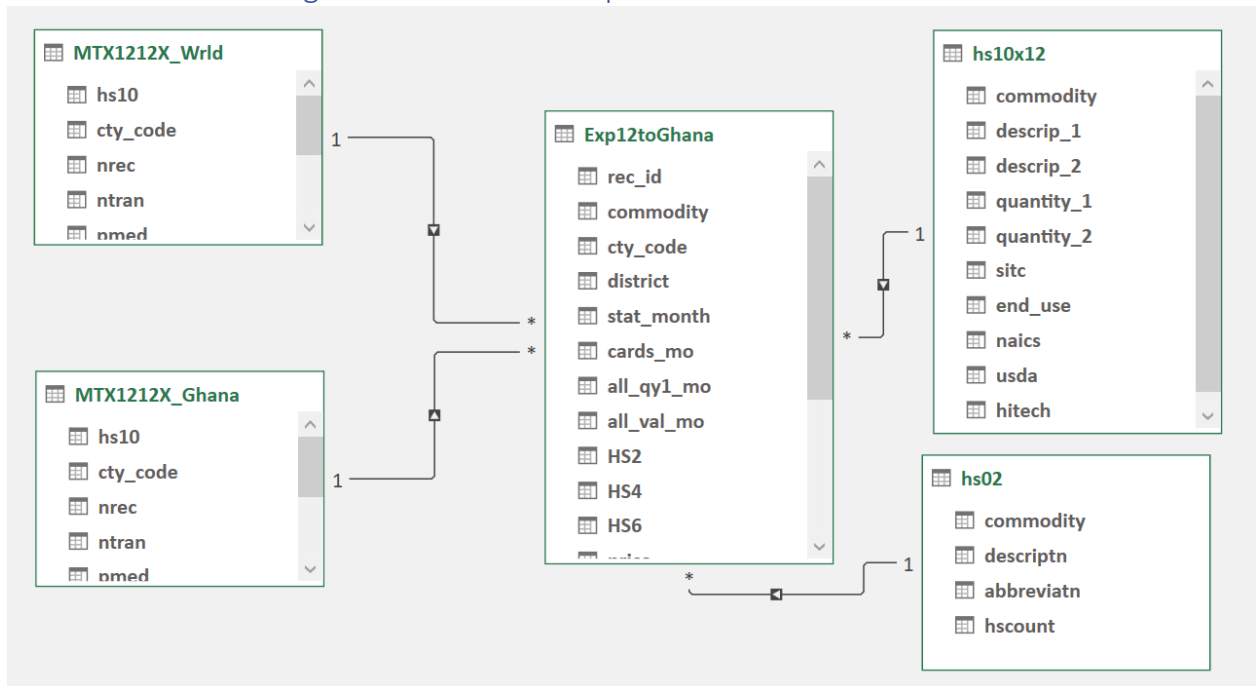
→ commodity in **hs10x02**

1. **hs10** in **MTX1212X_Wrld**

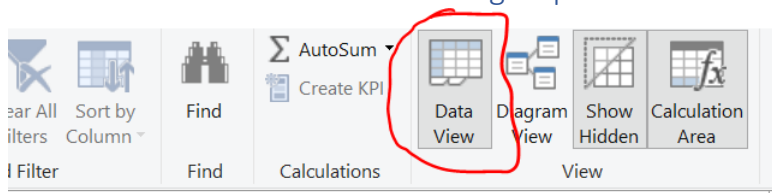
2. **hs10** in **MTX1212X_Ghana**

HS2 in **Exp12toGhana** → commodity in **hs02**

Here is the diagram view of the completed model:



XXXVIII. Now click “Data View” in the View group:



You should see a list of five tables at the bottom: Exp12toGhana, MTX1212X_Wrld, MTX1212X_Ghana, hs10x12, hs02.

XXXIX. Inserting Calculated Fields

Go to the table, “Exp12toGhana”

Double click the heading “Add Column” on the top right-hand side, and you can name a new field name to be calculated. Name it as price. Add six more columns: PLoQ_W, PUpQ_W, amt_un_w, amt_ov_w, descript_2, HS2_Description. Notice the calculated fields are highlighted in black.

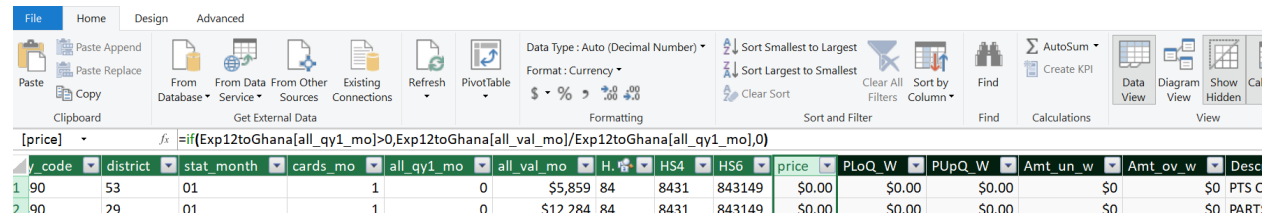
Now put a formula for each calculated field:

Start with price:

- Click the heading
- Type “=” and continue type
`=if(Exp12toGhana[all_qy1_mo]>0,Exp12toGhana[all_val_mo]/Exp12toGhana[all_qy1_mo],0)`
- Repeat the same procedure for the remaining fields:

- PLoQ_W: “=IF(ISBLANK(RELATED(MTX1212X_Wrld[ploq])),0,RELATED(MTX1212X_Wrld[ploq]))
- PUPQ_W: “=IF(ISBLANK(RELATED(MTX1212X_Wrld[pupq])),0,RELATED(MTX1212X_Wrld[pupq]))”
- amt_un_w: “=max(0,(Exp12toGhana[PLoQ_W] - Exp12toGhana[price])*Exp12toGhana[all_qy1_mo])”
- amt_ov_w: “=max(0,(Exp12toGhana[price]-Exp12toGhana[PUPQ_W])*Exp12toGhana[all_qy1_mo])”
- descrip_2: “=RELATED(hs10x12[descrip_2])” (comment: This is HS10 description)
- HS2_Description: “=RELATED(hs02[abbreviatn])”

For easy reading, the numbers may be formatted as \$ with two decimals for price fields, no decimals for amount fields.

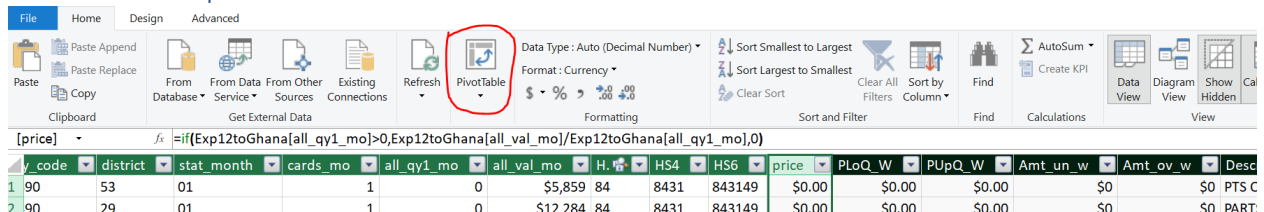


The screenshot shows the Microsoft Excel ribbon with the 'PivotTable' button circled in red. Below the ribbon, a formula bar displays the formula: `=if(Exp12toGhana[all_qy1_mo]>0,Exp12toGhana[all_val_mo]/Exp12toGhana[all_qy1_mo],0)`. The worksheet below shows a table with columns: y code, district, stat_month, cards_mo, all_qy1_mo, all_val_mo, H, HS4, HS6, price, PLoQ_W, PUPQ_W, Amt_un_w, Amt_ov_w, and Desc. The first two rows of data are visible.

y code	district	stat_month	cards_mo	all_qy1_mo	all_val_mo	H	HS4	HS6	price	PLoQ_W	PUPQ_W	Amt_un_w	Amt_ov_w	Desc
1 90	53	01		1	0	\$5,859.84	8431	843149	\$0.00	\$0.00	\$0.00	\$0	\$0	PTS C
2 90	79	01		1	0	\$12,784.84	8431	843149	\$0.00	\$0.00	\$0.00	\$0	\$0	PART

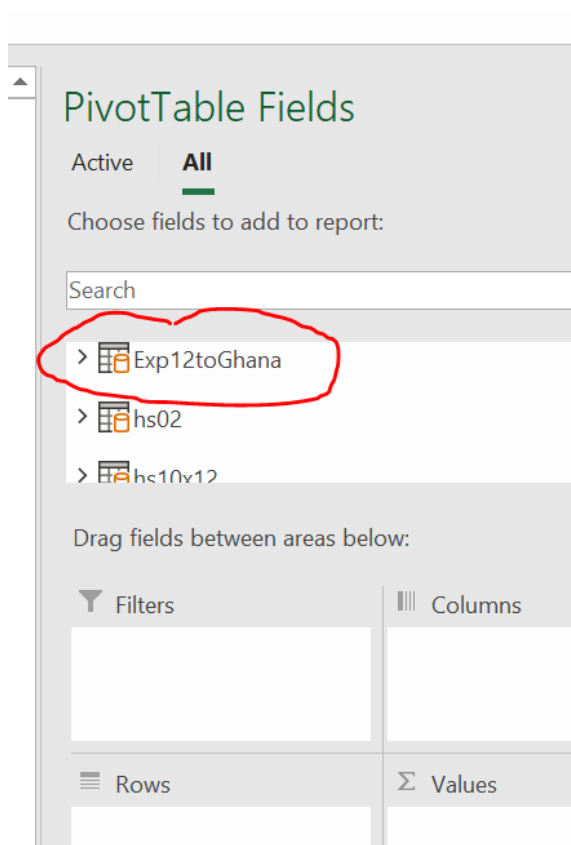
XL.Create Pivot Table to sort by IFF amount and identify high-risk HS10 commodity groups

XLI.PivotTable dropdown menu: Select Pivot Table > Choose “New Worksheet”



The screenshot shows the Microsoft Excel ribbon with the 'PivotTable' button circled in red. Below the ribbon, a formula bar displays the formula: `=if(Exp12toGhana[all_qy1_mo]>0,Exp12toGhana[all_val_mo]/Exp12toGhana[all_qy1_mo],0)`. The worksheet below shows a table with columns: y code, district, stat_month, cards_mo, all_qy1_mo, all_val_mo, H, HS4, HS6, price, PLoQ_W, PUPQ_W, Amt_un_w, Amt_ov_w, and Desc. The first two rows of data are visible.

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1 90	53	01		1	0	\$5,859.84	8431	843149	\$0.00	\$0.00	\$0.00	\$0	\$0	PTS C
2 90	79	01		1	0	\$12,784.84	8431	843149	\$0.00	\$0.00	\$0.00	\$0	\$0	PART



- II. Select the field “Descrip_2” from Exp12toGhana table
 - Then select three more fields from the same table: all_val_mo, amt_un_w, amt_ov_w
- II. Select the entire pivot table and copy it.
- V. Paste it in a range somewhere below the pivot table: Click Home > Paste (down arrow) > Select “Values (V)” from “Paste Values” group
- V. To find the list of top 10 (or 20) high risk commodities (at HS10 level) with Export Underinvoicing, sort the table in descending order of amt_un_w.
- VI. To find the list of top 10 (or 20) high risk commodities (at HS10 level) with Export Overinvoicing, sort the table in descending order of amt_ov_w.

This completes the PFM model for Ghana Export mispricing based on the US-World Price filter.

By using MTX1212X_Ghana, you can create a PFM model for Ghana Export mispricing based on the US-Ghana Price filter.

XLVII. Modeling PFM using Power Pivot for Ghana Import misinvoicing

For Ghana’s Import PFM analysis, follow the same process as in above steps “IV” and “V.”

Files for tables:

- US_Imp_fromGhana2012.xlsx
- MTX1212M_Wrld.xlsx (comment: Import commodity classification is different from Export commodity classification)
- MTX1212M_GHANA.xlsx
- hs10m12.xlsx
- hs02.xlsx

XLVIII. Final Note

- The data files, **US_Imp_fromGhana2012.xlsx** and **US_Exp_fromGhana2012.xlsx**, are extracted US import from Ghana and US export to Ghana from US Import data file and US Export data file, respectively.

- The price matrix files (**MTX1212X_Wrld.xlsx**, **MTX1212X_Ghana.xlsx**, **MTX1212M_Wrld.xlsx**, **MTX1212M_Ghana.xlsx**) are originally created using a relational database program from export and import records.
- In this exercise, there were substantial amount of manual processing. However, the entire exercise in session 10 can be automated using a relational database program starting from raw data at transaction level. The Power Pivot in Excel helps us understand the concept of relational database model building and create calculated fields of interest.

(Datasets prepared by Dr Simon Pak from USA and Ghana data(supplied by ISODEC))

GSS/ISODEC TRAINING WORKSHOP ON MEASURING IFFS IN WEST AFRICA

MONITORING IFFS IN COMPANY OPERATIONS AND TAX RETURNS

WHAT TO MONITOR

- monitor payments of **royalties, withholding taxes, management fees, loan interests**, and other financial transactions related to your MNE
- **Establish a centralized system:** Create a centralized system to manage all financial transactions related to your MNE. This system should be accessible to all stakeholders involved in financial transactions, including your MNE's financial team, auditors, tax authorities, and other relevant parties.
- **Use accounting software:** Use accounting software to track all financial transactions related to your MNE. This software should be able to record, process, and report financial transactions, including payments of royalties, withholding taxes, management fees, loan interests, and other expenses.
- **Implement controls:** Implement controls to ensure that all financial transactions are recorded accurately and on time. This includes implementing internal controls to prevent fraud and errors in financial reporting.
- **Hire experts:** Hire experts in tax, accounting, and finance to oversee financial transactions related to your MNE. These experts can help ensure compliance with local tax laws and regulations and provide guidance on financial reporting.
- **Monitor compliance:** Monitor compliance with local tax laws and regulations to ensure that your MNE is paying the correct amount of taxes and royalties. This includes staying up-to-date on changes in tax laws and regulations and regularly reviewing financial statements.
- **Conduct audits:** Conduct regular audits of your MNE's financial transactions to ensure that they are accurate and comply with local tax laws and regulations. This can help identify areas for improvement and prevent financial errors and fraud.

USING WHAT METRICS TO MONITOR?

- **Gross margin:** This metric represents the difference between your MNE's revenue and cost of goods sold. It can help you evaluate the profitability of your MNE's operations and identify areas for improvement.
- **Return on investment (ROI):** ROI measures the return on investment for a particular financial transaction. It can help you evaluate the effectiveness of your MNE's investments and identify areas where the return is not meeting expectations.
- **Accounts receivable turnover:** This metric represents the number of times your MNE collects its average accounts receivable balance during a given period. It can help you evaluate the efficiency of your MNE's collections process and identify areas for improvement.
- **Inventory turnover:** This metric represents the number of times your MNE sells and replaces its inventory during a given period. It can help you evaluate the efficiency of your MNE's inventory management and identify areas for improvement.
- **Operating cash flow:** Operating cash flow measures the cash generated or used by your MNE's operations. It can help you evaluate the ability of your MNE to generate cash from its core operations and identify areas where cash flow may be improving or declining.
- **Debt-to-equity ratio:** This metric measures the proportion of debt and equity financing that your MNE is using. A high debt-to-equity ratio indicates that your MNE may be taking on too much debt and may be at risk of defaulting on its loans.

What Metrics to measure MNEs Continued

- **Revenue growth:** This metric measures the increase or decrease in your MNE's revenue over time. A steady or increasing revenue growth rate can indicate a healthy financial position, while a declining rate can signal issues that need to be addressed.
- **Profitability:** This metric measures your MNE's ability to generate profits from its operations. It can be measured in terms of gross profit margin, operating profit margin, or net profit margin. A healthy profit margin indicates that your MNE is efficiently managing its costs and generating revenue.
- **Cash flow:** This metric measures the amount of cash that your MNE generates or uses in its operations. Positive cash flow indicates that your MNE has enough cash to cover its expenses, invest in growth opportunities, and pay dividends to shareholders.
- **Compliance with tax laws and regulations:** This metric measures your MNE's compliance with local tax laws and regulations. It can be measured in terms of the accuracy and completeness of your MNE's tax filings, as well as its ability to pay taxes on time. A delay in paying taxes means borrowing from the state at zero interest, meanwhile if and when the MNE lends to money they charge interests

YOU NEED A MODEL THAT EMPOWERS YOU TO:

- 1. Connect to your financial data sources:** Depending on the sources of your financial data, you may need to connect to databases, APIs, or file systems. Python has many libraries that can be used to connect to different data sources, such as pandas, SQLAlchemy, and Pyodbc.
- 2. Extract and clean your financial data:** Once you have connected to your data sources, you can use Python to extract and clean your financial data. For example, you can use pandas to read and clean data from Excel files or SQL databases.
- 3. Calculate financial metrics:** After cleaning your financial data, you can use Python to calculate financial metrics such as revenue growth, profitability, and cash flow. You can write custom functions to calculate these metrics or use pre-built functions from libraries such as NumPy and SciPy.
- 4. Visualize your financial data:** Python has several libraries for data visualization, such as Matplotlib and Seaborn. You can use these libraries to create charts and graphs to visualize your financial metrics and identify trends.
- 5. Set up automated reporting and alerting:** You can use Python or R to automate financial reporting and alerting. For example, you can set up a script to generate daily or weekly reports on your financial metrics and send them to stakeholders via email or Slack. You can also set up alerts to notify you when certain metrics fall outside of acceptable ranges.

STEPS TO DESIGN AND OPERATIONALISE SUCH A MODEL

1. **Define the scope and objectives of the model:** You need to determine what aspects of BEPS you want to measure and monitor, what information you need to collect, and what the ultimate goal of the model is.
2. **Identify relevant data sources:** You need to identify the data sources that can provide the necessary information for the model. This may include tax and financial data, as well as other relevant economic and industry-specific data.
3. **Develop an analytical framework:** You need to develop a framework that outlines how the data will be analyzed and interpreted to measure and monitor BEPS. This framework may involve developing algorithms or models that can identify patterns of BEPS activity.
4. **Create the model:** Based on the framework, you can create the actual model. This may involve building a software application or spreadsheet that can analyze the data and provide outputs that measure and monitor BEPS.
5. **Test and validate the model:** You need to test and validate the model to ensure that it is accurate and reliable. This may involve using real-world data to see how the model performs and making adjustments as necessary.
6. **Implement the model:** Once the model has been tested and validated, it can be implemented. This may involve integrating the model into existing tax and financial reporting systems, or it may involve creating new reporting systems to support the model.
7. **Monitor and update the model:** You need to continually monitor and update the model to ensure that it remains accurate and relevant over time. This may involve updating the data sources or modifying the analytical framework as new BEPS risks and challenges emerge.

END, THANK YOU FOR LISTENING

GSS/ISODEC IFFs TRAINING FOR Ghana, Liberia, Nigeria and Sierra Leone-March-2023

Designing and using local Comparables in Trade Mis-
pricing and Transfer-Pricing

(Bishop Akolgo)

THE CHALLENGE

- Combatting trade mis-pricing and transfer-pricing manipulations by multinational enterprises (MNEs) can be challenging for developing countries like Ghana
- However, one approach that can be used to address these issues is to construct and use local comparables.
- Local comparables are companies that are similar to the MNEs operating in Ghana, in terms of their size, industry, and operations.
- These local comparables can be used to benchmark the prices that the MNEs are charging for their goods or services.
- This will help to identify any pricing discrepancies that may be the result of trade mis-pricing or transfer-pricing manipulations.

HOW TO DO THIS

- To construct local comparables, a country can use publicly available financial information from local companies operating in the same industry as the MNEs.
- Ghana can also seek the assistance of international organizations such as the United Nations Conference on Trade and Development (UNCTAD) or the International Monetary Fund (IMF) to provide guidance on how to construct local comparables.
- Once local comparables are constructed, the country can use them to compare the prices charged by the MNEs with those charged by local companies.
- This can help to identify any discrepancies and take appropriate action to address the issue.

OTHER MEASURES

- In addition to constructing local comparables, a country can also strengthen its transfer pricing regulations and increase its capacity to enforce these regulations.
- This can include training tax officials to identify and investigate transfer pricing issues, as well as investing in technology and data analytics to assist in the detection of transfer pricing manipulations.
- Overall, constructing and using local comparables can be a useful tool for developing countries like ours to combat trade mis-pricing and transfer-pricing manipulations by MNEs.
- However, this approach should be used in conjunction with other measures to strengthen transfer pricing regulations and build capacity for enforcement.

EXAMPLE IMPLEMENTATION USING PYTHON

- 1.DataTable:** The DataTable interface allows you to display and interact with tabular data. You can use this interface to display the financial information of local companies and MNEs, and compare them side by side.
- 2.Graph:** The Graph interface allows you to create and display different types of graphs and visualizations. You can use this interface to plot the prices charged by the MNEs and local comparables, and identify any discrepancies.
- 3 Dropdown:** The Dropdown interface allows you to create a dropdown menu that users can use to select different options. You can use this interface to allow users to select the industry or sector they want to analyze, and display the corresponding data.
- 4.Slider:** The Slider interface allows you to create a slider that users can use to select a range of values. You can use this interface to allow users to filter the data based on specific criteria, such as revenue or profit.
- 5.Input:** The Input interface allows you to create a text input box that users can use to enter specific values. You can use this interface to allow users to search for specific companies or data points.

TO SUMMARISE

- Based on this user interface allows users to select the industry or sector they want to analyze, filter the data based on specific criteria such as revenue or profit, and search for specific companies or data points.
- The DataTable displays the financial information of local companies and MNEs side by side, and the Graph plots the prices charged by the MNEs and local comparables, allowing users to compare them and identify any discrepancies in real-time. The app callbacks filter the data based on the user's inputs and update the DataTable and Graph accordingly, allowing for real-time monitoring of trade mis-pricing and transfer-pricing abuse.

You can add more interfaces such as a map interface to visualize the locations of the local comparables and MNEs, or a dropdown menu to select the type of transaction to analyze.

The possibilities are endless, and you can use Plotly Dash to create a powerful and customizable user interface for real-time monitoring of trade mis-pricing and transfer-pricing abuse.

SAMPLE CODE

TOOLS FOR DATA EXPLORATION AND ANALYSIS

KEY PYTHON-BASED TOOLS

(By Bishop Akolgo)

(GSS/UNCTAD WORKSHOP ON THE MEASUREMENT OF IFFS)

ISODEC Offices-Accra-24th to 28th April, 2023

WHAT IS THE INTERQUARTILE AND WHY USE IT

- **five-number summary** is mostly used IN STATISTICS as it gives a rough idea about the dataset.
- **1.Minimum value:** It is the minimum value in the data set.
- **2.First Quartile, Q1:** It is also known as the lower quartile where 25% of the scores fall below it.
- **3.Median (middle value) or second quartile:** It is basically the mid-value in the dataset.
- **4.Third Quartile, Q3:** It is also known as the Upper quartile in which 25% of the data is above it and the rest 75% falls below it.
- **5.Maximum value:** It is the maximum value in the dataset.

PRICE FILTER METHOD

- Arm's length price filter: benchmark upper and lower bounds of prices for each commodity
 - a. Market price filter: (market price) +/- 5%, 10%, or more
 - b. Non-market price filter (Pak and Zdanowicz (1994): Statistical estimates
- Upper and lower prices in quintiles (eg: quartile, quintile, or decile) for each commodity code
- c. Requires detailed trade data at transaction level
- No need for partners' trade statistics

Interquartile Range

- Mathematically, it is basically defined as the difference between the third quartile (75th percentile) and the first quartile (25th percentile).
- $Q3 - Q1$
- IQR denotes the middle 50% hence also known as **midspread** or **H-spread** in statistics

THE EXERCISE

Exercise: Price-Filter Method

This table lists all U.S. export records of Aluminum wires in 2011, a total of 195 records.

0. Calculate the implied price of each record.
1. Find the lower quartile, median, upper quartile prices in 2011
2. Identify records with prices above the upper quartile prices
3. Identify records with prices below the lower quartile prices
4. Estimate overvalued amount or undervalued amount of each record
5. What is the total overvalued amount for all the exports to Ghana?

Interquartile range calculation

- Follow the below steps to calculate the same:
- Step 1: Insert the dataset.
- Step 2: Select any cell where you want to write the formula to calculate the values of Q1, Q3, and IQR.
- Step 3: First find the values of Q1 and Q3 using the quart values as 1 and 3 respectively.
- Step 4: deduct Q1 from Q3
- Step 5: Lets practice

CREATING INTERQUARTILE RANGE

- $\text{PRICE} = \text{Value} / \text{Quantity}$
- Total 195 records
- Low Quartile at $195 * 0.25 = 49\text{th}$ (go to row 52)
- Median price at $195 * 0.5 = 98\text{th}$ (go to row 102)
- Upper quartile at $195 * 0.75 = 146\text{th}$ (go to row 149)

- Overpriced = (price - upper quartile price) or zero if negative
- Underpriced = (PRICE - lower quartile price) or zero if negative
- Lower Quartile Price=3.803468208
- Upper Quartile Price=6.020361991

SUMMARY-PRICE FILTER METHODOLOGY

- Estimate Mispriced amount
 - a. Identify abnormally priced / mispriced transactions outside the benchmark bounds
- Overpriced if above the upper bound price
- Underpriced if below the lower bound price
- b. How to measure mispricing?
- **Overvalued** = (Declared value) – (value based on **upper bound** price)
- **Undervalued** = (value based on **lower bound** price) – (Declared value)

WHAT IS PIVOT TABLE AND WHY USE IT?

- A PivotTable is an interactive way to quickly summarize large amounts of data.
- You can use a PivotTable to analyze numerical data in detail, and answer unanticipated questions about your data.
- A PivotTable is especially designed for: Querying large amounts of data in many user-friendly ways.
- Also helps you to clean and format your data ready for analysis

PIVOT TABLES OR POWER PIVOT?

- Power Pivot **enables users to manipulate data input, create relationships, and better understand where the company currently stands in relation to one metric or another.**
- Power Pivot also enables users to create visual data that can be outputted to Excel worksheets. It includes PivotTables and PivotCharts.
- Power Pivot is an Excel feature that enables the import, manipulation, and analysis of big data without loss of speed/functionality.
- **Power Pivot tables are pivot tables** that that allow the user to mix data from different tables, affording them powerful filter chaining when working on multiple tables.

Creating a Pivot Table

- To Manually create a PivotTable
- Load your data
- Clean your data
- Click a cell in the source data or table range.
- Go to Insert > PivotTable. ...
- Excel will display the Create PivotTable dialog with your range or table name selected. ...
- In the Choose where you want the PivotTable report to be placed section, select New Worksheet, or Existing Worksheet.

Creating the Pivot Table

- Step 4: Create a Pivot Table
- Select the Data You Want to Analyze.
- Choose “Pivot Table” from the “Insert” Tab.
- Select the Data You Want to Add to Your Table.
- Open the New Worksheet Tab.
- Choose the Fields for Your Pivot Table.
- Drag the Fields to the Desired Area.
- Change the Value Field.
- View Your New Pivot Table.

EXAMPLE-PRACTICE EXERCISE

- Load the practice file called ???
- When file opens,go to

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Preparing data files for Pivot table analysis

- Load data file into excel
- Before analysis, file needs to be cleaned and formatted
- Lets get on and practice

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- Estimate Mispriced amount
 - a. Identify abnormally priced / mispriced transactions outside the benchmark bounds
- Overpriced if above the upper bound price
- Underpriced if below the lower bound price
- b. How to measure mispricing?
- **Overvalued** = (Declared value) – (value based on **upper bound** price)
- **Undervalued** = (value based on **lower bound** price) – (Declared value)

Guide to Modeling PCM for Ghana

File: Lesson 9: **PCM-PowerPivot-Ghana2012_Analysis_v1.xlsx**

I. Objectives:

- a. Estimate the difference between Ghana's reported export to its partner countries (Ghana_X.xlsx) and Partner countries' reported import from Ghana (Partner_M.xlsx)
- b. Estimate the difference between Ghana's reported import from its partner countries (Ghana_M.xlsx) and Partner countries' reported export to Ghana (Partner_X.xlsx)
- c. Identify top 10 or 20 high-risk countries with misinvoicing in export and import

II. Data source: IMF DOTS, 2012 monthly.

III. Complication:

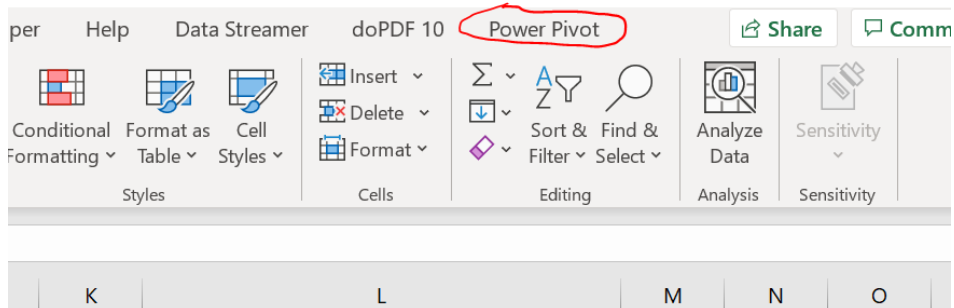
The list of partner countries reported by Ghana does not match the partner countries which reported having trade (export or import) with Ghana.

Illustration:

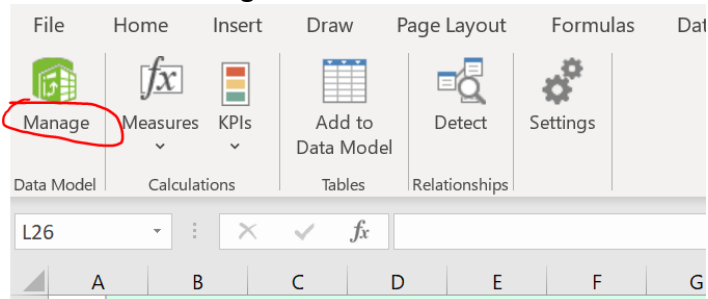
- a. Ghana's export list of partner countries: A, B, C, D
- b. List of Countries reported as having imported from Ghana: A, B, D, E.
- c. For Country C, Ghana reported as having exported but Country C did not report any import from Ghana
- d. For Country E, Ghana has no record of having exported to E, but E reported as having imported from Ghana
- e. To put together all the data from Ghana's export and Partners' import, we need to create a list of all countries: A, B, C, D, and E: Name the file as **PCM_Ghana_X_Analysis.xlsx** (**PCM_Ghana_M_Analysis.xlsx** for import analysis.) This file has only one column with a list of all the countries, A, B, C, D, E.
- f. Using Power Pivot in Excel, build a model relating **PCM_Ghana_X_Analysis.xlsx** to **Ghana_X_2012.xlsx** and **Partner_M_2012.xlsx** and create calculated fields:
 - i. $\text{Export_Over_Invoiced_amount} = \text{MAX}(0, (\text{Ghana_X} - \text{Partner_M}/1.1))$
 - ii. $\text{Export_Under_Invoiced_amount} = \text{MAX}(0, (\text{Partner_M}/1.1 - \text{Ghana_X}))$
 - iii. Dividing import data by a factor of 1.1 is because import data is reported as CIF while export data as FOB.

IV. Modeling PCM using Power Pivot for Ghana Export misinvoicing

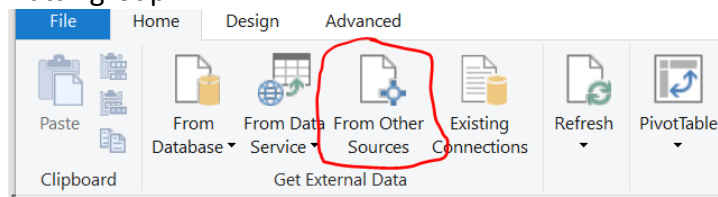
- a. Open a new Excel blank workbook. Save it as **=xlsx**
(If Power Pivot is not activated, activate Power Pivot: File > Options > Add-ins > Select "Microsoft Power Pivot for Excel" from Inactive Application Add-ins list)
- b. Click "Power Pivot" from the ribbon



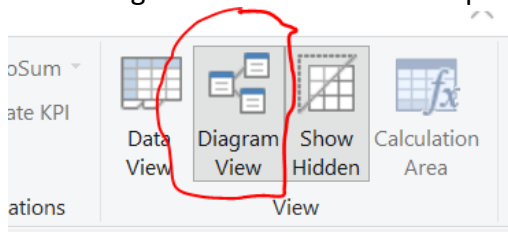
c. Click Manage



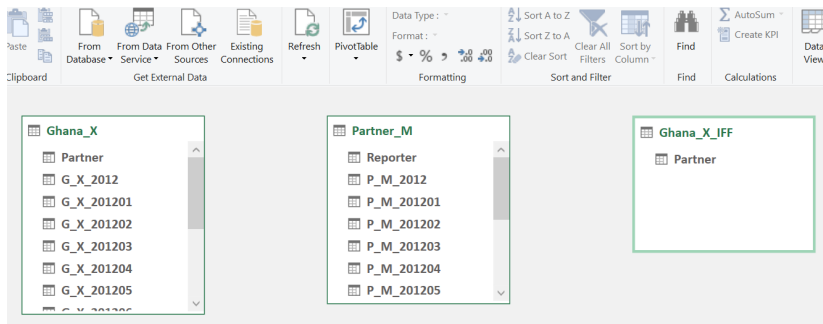
d. To import **Ghana_X_2012.xlsx** data, select "From Other Sources" from "Get External Data" group



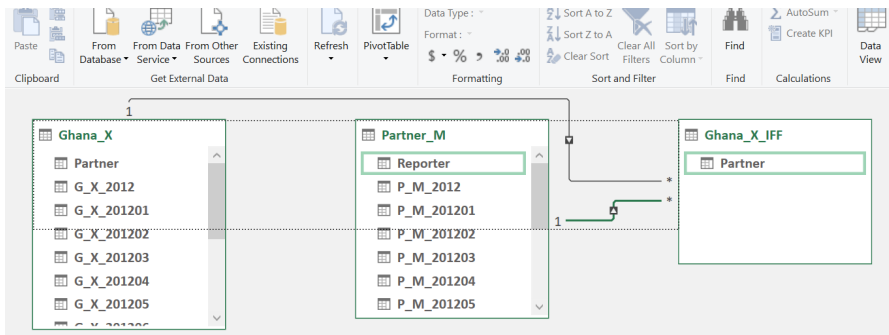
- You will see a list of Relational Databases. Scroll through to the bottom of the list. Select Excel File (or Text File for importing a CSV file) > Browse > & check "Use first row as column headers" > Next > Finish (name the table as **Ghana_X**)
- Repeat to import **Partner_M_2012.xlsx** (name the table as **Partner_M**) and **PCM_Ghana_X_Analysis.xlsx** (name the table as **Ghana_X_IFF**)
- Click "Diagram View" in View Group



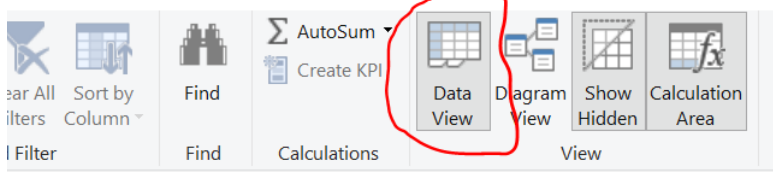
h. Then you will see three tables

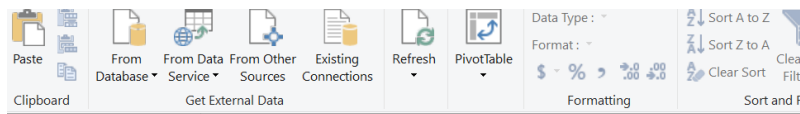


- i. At this point, three tables are not related to each other. To model the relation between Ghana_X_IFF and Ghana_X, drag the field, "Partner" from Ghana_X_IFF to "Partner" in Ghana_X. Repeat this process for Partner in Ghana_X_IFF to Reporter in Partner_M.
- j. There should be lines linking tables. At the ends of the lines, a "*" should be on the side of Ghana_X_IFF table and a "1" on Ghana_X and Partner_M. This indicates one-to-many relations.



- k. Now click "Data View" in the View group:





	Pa...	Ghana_X	Partner_M	Ghana_X_Over	Ghana_X_Under	Add Column
1	Afghanist...	0.00065		0.00065	0	
2	Algeria		2.608016	0	2.37092363636364	
3	America...	0.044412	0.047076	0.001615636363...	0	
4	Angola	4.169004	9.985931	0	4.90911509090909	
5	Antigua a...	88.645854	0.016493	88.6308603636364	0	
6	Argentina	0.003848	0.019008	0	0.013432	
7	Armenia,...		0.416248	0	0.378407272727273	
8	Asia not ...	0.00082		0.00082	0	
9	Australia	5.635534	7.723394	0	1.38573327272727	
10	Austria	0.550775	0.259286	0.315060454545...	0	
11	Azerbaija...		0.0654	0	0.0594545454545...	

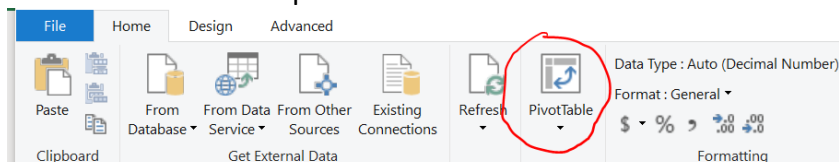
Ghana_X Partner_M Ghana_X IFF

Record: 1 of 172

For easy reading, the numbers may be formatted as \$ with no decimals.
This completes the Ghana's Export overinvoicing and Export under-invoicing calculation.

V. Create Pivot Table to sort by IFF amount and identify high-risk partners

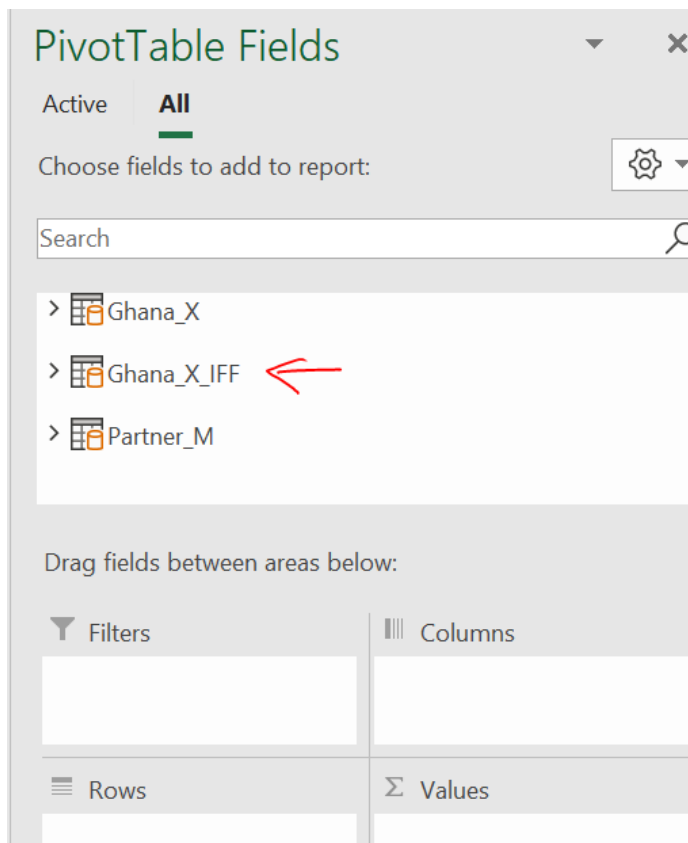
a. PivotTable dropdown menu: Select Pivot Table > Choose "New Worksheet"



	Pa...	Ghana_X	Partner_M	Ghana_X_ov	Ghana_X_un	Add Colum
1	Afghanist...	0.00065		0.00065	0	
2	Algeria		2.608016	0	2.3709236363...	
3	America...	0.044412	0.047076	0.0016156363...	0	
4	Angola	4.169004	9.985931	0	4.9091150909...	
5	Antigua a...	88.645854	0.016493	88.630860363...	0	

[Ghana_...]fx =max(0,Ghana_X_IFF[Partner_M]/1.1-Ghana_X_IFF[Ghana_X])

b. Select the field "Partner" from Ghana_X_IFF, then Ghana_X_ov, Ghana_X_un



- c. Select the entire pivot table and copy it.
- d. Paste it in a range somewhere below the pivot table: Click Home > Paste (down arrow) > Select “Values (V)” from “Paste Values” group
- e. To find the list of top 10 (or 20) high risk countries with Export Underinvoicing, sort the table in descending order of Ghana_X_un.
- f. To find the list of top 10 (or 20) high risk countries with Export Overinvoicing, sort the table in descending order of Ghana_X_ov.

VI. Modeling PCM using Power Pivot for Ghana Import misinvoicing

For Ghana’s Import analysis, follow the same process as in “IV. Modeling PCM using Power Pivot for Ghana Export misinvoicing” and “V. Create Pivot Table to sort by IFF amount and identify high-risk partners.”

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G:\Ghana2021\Worshop\Session09_PCM_PowerPivot\PCM-PowerPivot-Ghana2012_Analysis_v1.docx