National Parameters and Commodity Specific Conversion Factors for Project Evaluation in Uganda

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Development Discussion Paper: 2018-04

ABSTRACT

In this project, the National Parameters which includes the Economic Opportunity Cost of Capital (EOCK), the Foreign Exchange Premium (FEP) and the Premium for Non- Tradable Outlays (NTP) were estimated for the Ministry of Finance, Planning and Economic Development of the Republic of Uganda (MoFPED), the commodity – specific conversion factors for Uganda was estimated and a database for the Republic of Uganda for the national parameters and commodity – specific conversion factors was created.

After conducting a sensitivity analysis for the key parameters used in this study to ensure the robustness of estimate, the simulation results for the economic opportunity cost of capital (EOCK) shows that 11% is the net value. Values obtained for the foreign exchange premium (FEP) is 7.25%, and 1% for the premium on Non – tradable outlays (NTP). The national parameters and commodity–specific conversion factors (CSCF) could be found on http://national-parameters.ug.

Executive Summary

Cambridge Resources International Inc. (CRI) estimated the national parameters including the economic opportunity cost of capital (EOCK), the foreign exchange premium (FEP) and the premium for non-tradable outlays (NTP) for the Ministry of Finance, Planning and Economic Development of the Republic of Uganda (MoFPED). These national parameters are the essential determinants for practical application to the economic appraisal of investment projects in a consistent manner for a country.

The EOCK is the weighted average economic cost of capital used to discount the economic benefits and costs of a project to determine if the project is economically viable. Given the data obtained and used for the analysis, results suggest that 11 percent real is the conservative estimate for EOCK.

The FEP is defined as the excess of the economic value of foreign exchange over the market exchange rate for a country. The model used captures the distortions associated with changes in demand and supply between the tradable and non-tradable sectors after funds are raised in the capital market and spent on tradable goods and non-tradable outlays. The simulation results indicate that the FEP and the NTP for Uganda are 7.25 percent and 1.00 percent, respectively.

The Commodity-Specific Conversion Factors (CSCF) Database has also been developed. CSCFs are used to translate market prices for goods and services into corresponding economic value by accounting for various distortions that are present in the economy such as taxes, subsidies, monopolies, etc. The database contains CSCFs for all tradable commodities, listed under the Harmonized System for classifying goods, and 16 non-tradable items such as Construction, Electricity, Telecommunication and Transportation services. The national parameters and CSCFs are available for public access at http://national-parameters.ug.

A capacity building and knowledge transfer to Government officials was emphasized throughout the assignment. First, a one-week intensive training program was delivered for 30 officials from MoFPED, Line Ministries, and other agencies. The training program covered the theoretical aspects of the estimation of national parameters and CSCFs as well as its application to investment projects in Uganda. Second a two-days' workshop focused on the details of the estimates in Uganda was delivered to 25 government officials. Additional discussions were held with the IT department of MoFPED to transfer the software and ensure adequate maintenance and technical support. Lastly, the national parameters and CSCFs were presented to a broader range of stakeholders during the senior level half-day workshop.

1. Introduction

In April 2017, MoFPED has contracted CRI to estimate National Parameters, CSCFs, and unitary prices database for Uganda to facilitate the economic and social appraisal of investment projects. In particular, the database should be able to provide information on:

1. National Parameters including EOCK, FEP, NTP, and tax rates including VAT;
2. CSCFs for tradable commodities;
3. CSCFs for non-tradable commodities;
4. Unitary prices for domestic and imported materials.

The duration of the assignment was set to nine months starting from the contract sign date. The consultancy was completed within the agreed timeline and by the technical specifications provided by the client.

The national parameters and CSCFs are currently available under open access at http://national-parameters.ug. The software provides all the details of the estimates made, allowing an analyst to apply any changes if deemed feasible. However, to further strengthen the consistency of the projects appraisal element of the Public Investment Management System in Uganda, it is recommended to enforce the use of the software in the process of the preparation and appraisal of public investment projects and public private partnerships.

This report is composed of four sections. The following section presents the national parameters estimates. The third section describes estimates of CSCFs tradable and non-tradable commodities in Uganda. The fourth section discusses the website functionality. The capacity building element of the consultancy is presented in the next section. The last section provides conclusions and recommendations to further strengthen the process of the projects preparation, appraisal, and selection in Uganda.

2. Estimation of Uganda's National Parameters

Three national parameters were estimated over the course of this assignment. A separate report discussing the details of the estimates and methodological approach used to derive the final figures were prepared and submitted to MoFPED (see Annex A):
1. Economic Opportunity Cost of Capital is 11.0 percent;
2. Foreign Exchange Premium is 7.25 percent;
3. Premium for Non-Tradable outlays is 1.0 percent.

2.1. Economic Opportunity Cost of Capital

Choosing a discount rate used for the time value of the costs and benefits from the viewpoint of society has been one of the most contentious and controversial aspects of the economic or cost-benefit analysis of investment projects.[1] It is similar to the concept of the private opportunity cost of capital used to discount a stream of net cash flows of an investment project, but the implications can be more complex. With costs and benefits expressed in real values, people prefer to make payments later and receive benefits sooner because of time preference for current consumption to future consumption. Similarly, there is an opportunity cost of the resources invested in any given activity as they could have been invested elsewhere if not being spent on this activity being evaluated.

EOCK for Uganda was estimated using a weighted average of the gross-of-tax rate of return on private investment and the time preference rate for consumption. Many professionals have chosen to use this concept to estimate the discount rate for a country. The empirical results suggest 10.74% as the EOCK for Uganda in the base case. To ensure the robustness of the estimates, a sensitivity analysis was conducted for the key parameters used in the estimation. The simulation results range from 9.96% to 11.90% and center around 11.0%. This suggests that the 11 percent real rate is the appropriate discount rate to be used for the time value of the costs and benefits from the viewpoint of society.

2.2. Foreign Exchange Premium and Premium for Non-Tradable Outlays

The other national parameters used in the evaluation of investment projects are the foreign exchange premium (FEP), and the premium for non-tradable outlays (NTP). These premiums are generated because of trade and other indirect tax and subsidy distortions at the point in time that the funds are raised in the capital market and spent on tradable and non-tradable goods. They are best expressed as a percentage of the market foreign exchange rate and the financial value of non-tradable goods,

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[1] More theoretical arguments can be found in literature, e.g., Sandmo and Dreze (1971), Harberger (1972), Spackman (2010), Burgess (2013), Burgess and Zerbe (2013), Harberger and Jenkins (2015).

respectively so that they can be easily incorporated in the economic evaluation of projects from the analysis of the financial evaluation.[2]

The conceptual framework employed to measure these premiums is based on a three-sector general equilibrium model in an economy developed by Harberger and Jenkins.[3] The three sectors of this model consist of importable, exportable, and non-tradable goods. Both importable and exportable goods are part of tradable goods. This framework was further developed by Kuo, Salci, and Jenkins into an operational guide and empirically applied to some countries in Africa.[4] This model is employed here to measure the FEP and the NTP for Uganda.

The model is carried out to estimate the FEP and the NTP for Uganda. In the base case, they are estimated at 7.39% and 1.13%, respectively. A sensitivity analysis is also conducted for the key parameters. The simulation results indicate that the FEP ranges from 6.74% to 7.75% while the NTP from 0.48% to 1.50%. These results suggest that the values of the FEP and the NTP for Uganda are 7.25 percent and 1.00 percent, respectively.

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[2] See, e.g., Jenkins, Kuo, and Harberger, (October 2014).

[3] Harberger, and Jenkins, (2002). A diagrammatic and numerical illustration can be found in Jenkins, Kuo, and Harberger (October 2014).

[4] Kuo, Salci, and Jenkins, (June 2015).

3. Estimation of Commodity-Specific Conversion Factors for Uganda

The Commodity-Specific Conversion Factors (CSCF) Database[5] has been developed. CSCFs are used to translate market prices for goods and services into corresponding economic value by accounting for various distortions that are present in the Ugandan economy such as taxes, subsidies, monopolies, etc. The database contains CSCFs for all tradable commodities, listed under the Harmonized System for classifying goods, and 16 non-tradable items such as Construction, Electricity, Telecommunication and Transportation services. More details on the estimation and methodology used are available in the User Manual (See Annex B).

The focus of this section of the report is to briefly present the estimation of CSCFs for tradable and non-tradable goods and services for the Ugandan economy. The first subsection presents the outputs of the study for CSCFs for tradable commodities, while the second subsection provides the Conversion Factors estimated for non-tradable goods and services.

3.1. Conversion Factors for Tradables

The analysis commenced by identification of the tax distortions associated with tradable commodities in Uganda, such as import tariffs, excise duties, export taxes, subsidies, and VAT. CRI has also attempted to analyze the markets for the goods and services to identify if there are monopolies or monopsonies for any particular goods and services. However, no evidence of such was observed. Then the CSCFs for all goods listed in HS code was estimated consistently to account for the considerable influence of the distortions on the financial price of the tradable goods in the market. The CSCFs are estimated for both cases of the project using the tradable good as an input and producing the good as the output.

The CSCF estimations for all of the tradable commodities in the database range from 0.2244 for cigarettes, on which high excise duties are levied, to 1.0725 for exportable outputs, which generate 7.25% FEP and are currently neither taxed or subsidized in Uganda.

3.2. Conversion Factors for Non-tradables

The estimation of economic prices and CSCFs for non-tradable goods and services takes into account all repercussions of the project in the economy by capturing all distortions in the direct product and indirect input markets of the non-tradables.

A comprehensive formula was used to account for all distortions in the direct and indirect markets as well as the impact of capital funds used to purchase non-traded goods. The CSCF for these goods and services are calculated so that they can easily translate the market prices used in the financial analysis into the economic prices

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[5] The database is accessible through http://national-parameters.ug/.

needed to construct the economic resource statement. The conversion factors of these goods and services are presented in Table 1:

Table 1: Commodity Specific Conversion Factors for Non-Traded Goods

Item	CSCF
Construction of Building Services	0.8781
Electricity, Gas, Steam and Air Conditioning Supply	0.9053
Telecommunication Services	0.9006
Rail Transport	0.8599
Passenger Land Transport	0.8677
Freight Transport by Road	0.8715
Air Transport Service	0.8933
Warehousing & Support Services for Transportation	0.8985
Information Services	0.8995
Repair & Installation of Machinery and Equipment	0.9026
Sales & Repairs of Motor Vehicles and Motorcycles Services	0.9077
Wholesale Trade	0.8840
Retail Trade	0.9098
Computer Programming, Consultancy & Related Services	0.9097
Scientific Research & Development Services	0.9076
Advertising & Market Research Services	0.8827

4. Website Features and Functionality

Uganda Commodity-Specific Conversion Factors Database is web-based software that provides open access to the national parameters and CSCFs for tradable and Non-tradable commodities and services. The program provides multiple ways to search and browse the database with an easy to learn interface. It is designed for professionals involved in the economic and social appraisal of public investment projects in Uganda.

4.1. Website In-brief

Users will be met with a homepage every time they visit the website. All sections of the website simply can be accessed using the top navigation pane.

The website is equipped with a comprehensive search engine that facilitates the search for the tradable commodities in the database. Users can search according to a keyword, HS Code[6] or (Sub)Chapter Number.

Browse categories page provides an alternative way to search through tradable commodities, categorized into 99 HS chapters. When a user selects a chapter, the chapter will expand and reveal all sub-chapters associated with the chapter. Once the sub-chapter is also selected, it will expand to show all commodities within the sub-chapter. For each commodity selected, four different types can be selected to reveal different estimations, which are "Importable Input", "Importable Output", "Exportable Input" and "Exportable Output".

Users are allowed to automatically save their estimation results to an excel file. Users can add various commodities (tradable or non-tradable) or different types of a particular tradable commodity to the download list each time CSCF is displayed for the commodity. Once the desired numbers of items are added to the list, the list can be downloaded for their future reference.

The website is designed in a manner that allows users to temporary update the key inputs to the website. For instance, the estimates of CSCFs for tradable goods can be easily updated if either the custom duty rates, value-added taxes, environmental tax or the foreign exchange premium (FEP) change. Permanent update of the key inputs is only restricted to the users with administrative access to the website through administrator login credentials.

A comprehensive user manual is accessible through "Help" button on the Home Page (see Annex B). This user manual provides a helpful guide on how to use the system and all its components. The manual well describes the user interface of the program. It also provides a brief discussion of the use of CSCFs in project evaluation, their different types and the choice of the relevant ones when carrying out an economic appraisal of an investment project.

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[6] The Harmonized Commodity Description and Coding System, generally known as the Harmonized System (HS) is used by the World Customs Organization (WCO) as an internationally standardized system of names and numbers to classify traded products.

Administrative Manual (see Annex C) serves as a guide to the ones who will be in charge of the website maintenance. This document contains step-by-step instructions on how to navigate through the "Administrator" side of the website. It is not technical documentation and does not contain installation instructions or general user instructions. The manual also contains instructions on the spreadsheets to be used by the admin to update, when necessary, the estimations for the national parameters and commodity-specific conversion factors (CSCF).

5. Knowledge Transfer and Capacity Building

As a part of knowledge transfer approach, CRI held (i) a one-week training program, (ii) a two-day workshop to increase capacity and maximizes outcome and application of the study. In addition, a half-day workshop was held in Kampala to present the project to a broader community. Below you may find a brief explanation of each event.

5.1. One-Week Training Program

Offered from October 30 to November 03, the one-week training program focused on the estimation of National Parameters and Commodity-Specific Conversion Factors. The program also covered various aspects involved the appraisal of public investment projects and PPPs including complex issues such as economic aspects of foreign financing and contingent liabilities arising from PPP projects. The program's theoretical and practical parts were selected to equip the Government of Uganda with the skills required to effectively and efficiently undertake an economic appraisal of the projects. The program, therefore, further contributed to the ongoing effort of the Government to enhance PIM system of the country. CRI was able to complete the entire program as scheduled.

Imperial Golf View Hotel in Entebbe, Uganda, was chosen as the program's venue. The venue was found to be a suitable place to focus on such an intensive training program.

A total of 24 participants attended this training program. There were a good number of officers from the Ministry of Finance, Planning and Economic Development as well as National Planning Authority. The participants found the program in line with the nature of their work and of great value to it.

Participants submitted a detailed Program Evaluation at the end of the course. Results of the evaluations are well above the benchmarks, and the course was uniformly found to be very useful. All participants, who responded, suggested that their colleagues must also be given the opportunity to participate in this program (See Annex D for the results of the program evaluation).

5.2. Two-day Workshop

Offered from February 12 to 13, the two-day workshop focused on the website presentation and estimation of National Parameters and Commodity-Specific Conversion Factors for Uganda. The workshop also included several practical sessions. During these sessions, participants got familiar with the National Parameters website and its specific features. The workshop's theoretical and practical parts were selected to equip participants with the skills required to effectively and efficiently undertake an economic appraisal of the projects using the national parameters database. The program, therefore, further contributed to the ongoing effort of the Government to enhance PIM system of the country.

Lake Victoria Serena Golf Resort was chosen as the program's venue. The venue was found to be an ideal place to focus on such a workshop.

A total of 31 participants attended this workshop. There were a good number of officers from the Ministry of Finance, Planning and Economic Development and National Planning Authority. Makerere University was among the institutions that attended the workshop. The participants found the workshop in line with the nature of their work and of great value to it.

5.3. Senior Level Half-Day Workshop

The National-Parameters website was officially launched by Mr. Patrick Ocailap, Deputy Secretary to the Treasury and presented to participants from a variety of institutions in Imperial Royale Hotel on February 14, 2018.

There were a good number of officers from the Ministry of Finance, Planning and Economic Development, National Planning Authority and other governmental and non-governmental key institutions. Makerere University was also among the institutions who were present in the launch of the program.

During question and answer session, participants have repeatedly raised the point that the launch of the program will fill the current existing gaps and will highly contribute to the ongoing effort of the Government to enhance PIM system of the country. The participants found the National Parameters database of great value to current concerns of the country.

6. Conclusions and Recommendations

The consultancy was completed on time and within the expectations of the MoFPED. This was only made possible because of the support extended by the Project Analysis and Public Investment Management Department, MoFPED. The officials from the department have been responding to numerous data requests on time despite the fact that most of the data were collected by the agencies outside MoFPED.

We would like to provide two recommendations to further institutionalize best practices of project appraisal to PIM systems of Uganda:

1. The use of national parameters and CSCFs published on the website has to be recommended or made mandatory by the MoFPED to MDAs and other stakeholders involved in the process of projects preparation and appraisal. In case of the use of alternative estimates, LMs shall make a strong case by providing a clear justification. Examples of such exemptions may include the application of lower EOCK for social sectors, only when approved by the MoFPED.

2. Continuous capacity building in project preparation and appraisal across all spending agencies and MDAs at central and local levels is required to stimulate the use of the software. This capacity building will not only increase the utilization of the software but also enhance evidence-based decision making on public investments.

Also, it is recommended to update the estimates for the national parameters and CSCFs on a regular basis, say every three or five years. The website can be further improved by the publishing of sector-specific studies that can provide useful input to the process of projects preparation and appraisal. Such studies may include estimation of the value of time for road users, electricity least cost expansion plans, estimates for vehicles operating costs, estimation of willingness to pay for off-grid electricity, etc. These studies sometimes are conducted by the line ministries, but rarely made available for public access.

Annex A: Uganda's National Parameters Report

Estimation of the National Parameters for Project Evaluation in Uganda

Final Report

Date: January 23, 2018

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Executive Summary

In this paper, an analytical framework and a practical approach are developed to measure the economic opportunity cost of capital (EOCK) and the foreign exchange premium (FEP) and the premium for non-tradable outlays (NTP). These national parameters are the essential determinants for practical application to the economic appraisal of investment projects in a consistent manner for a country.

An application of the model is carried out for Uganda since Uganda is a small open economy and also well integrated in the global capital market. Estimate of the EOCK is based on the hypothesis that when funds are raised in the capital market to finance any investment project, those funds are likely to come from displaced investment, newly stimulated domestic savings, and newly stimulated foreign capital inflows. It can then be estimated as a weighted average of the opportunity cost of each of the three alternative sources of funds. The EOCK is the most appropriate rate used to discount the economic benefits and costs of a project to see if the project is economically viable for society as a whole.

The empirical results generate 10.74% of the EOCK for Uganda in the base case. To ensure the robustness of the estimates, a sensitivity analysis is conducted for the key parameters used in the study. The simulation results range from 9.96% to 11.90%, and center around 10.5% and 11.0%. Given the data obtained and used for the analysis, these results suggest that a 11 percent real rate is an appropriate and the conservative discount rate to use when calculating the net present value of the flows of annual economic benefits and costs over the life of a project.

The FEP is defined as the excess of the economic value of foreign exchange over the market exchange rate for a country. Similarly, the NTP is the amount of the economic over the financial value of non-tradable. This difference is caused by distortions such as import duty, value added tax, excise tax and subsidy in the economy. They are quantified and used to convert the financial values of tradable and non-tradable inputs and outputs into the corresponding economic values as they are triggered each time money is sourced in the capital market and spent on tradable and non-tradable goods.

The framework for measuring these premiums is based on three-sector general equilibrium model in an economy, including importable, exportable and non-tradable goods in which the first two are combined as tradables. The model is further developed into an operational simulation model to capture the distortions associated with changes in demand and supply between the tradable and non-tradable sectors after funds are raised in the capital market and spent on tradable goods and non-tradable outlays.

The model is carried out to estimate the FEP and the NTP for Uganda. In the base case, they are estimated at 7.39% and 1.13%, respectively. A sensitivity analysis is also conducted for the key parameters. The simulation results indicate that the FEP ranges from 6.74% to 7.75% while the NTP from 0.48% to 1.50%. These results suggest that the reasonable values of the FEP and the NTP for Uganda will be 7.25 percent and 1.00 percent, respectively.

1 Introduction

The purpose of this paper is to describe an analytical framework and a practical approach that will enable us to estimate two national parameters used for evaluating investment projects in Uganda. These parameters are the economic opportunity cost of capital (EOCK) and the foreign exchange premium (FEP) and the premium for non-tradable outlays (NTP).

The EOCK is a discount rate used to estimate the economic present value of the resource cost and the benefits that accrue over time from an investment project. This is similar in concept to the financial evaluation of a project in which a private opportunity cost of capital is used to discount the financial cash flows of the investment. However, the discount rate used for measuring the net present value of the country's costs and benefits over years is quite different from the private cost of capital. This is due to the fact that various income taxes and other distortions impact on different inter-temporal rates of return of the project funds when viewed from the private and the public perspectives.

By the same token, the financial value of tradable and non-tradable goods and services can differ from the economic value from national perspective. This occurs because of indirect taxes such as tariffs, non-tariff barriers, general sales taxes and other distortions associated with goods and services purchased or produced by projects. Unlike the income taxes involved in inter-temporal distortion on the EOCK, these distortions are contemporary that are triggered each time money is sourced in the capital market and spent on tradable and non-tradable goods. They must be taken into consideration in a consistent manner for the economic evaluation of projects.

Estimates of these parameters for Uganda depend on types of taxes and subsidies in the markets, the economic structure, the performance of the economy, and the opportunity cost of funds used to finance the projects. Uganda is a small and open developing economy. It is integrated into the global economy in which the global economic outlook will also have the potential impact on the Ugandan financial market and the economy. Agriculture in Uganda has been the most important sector of the economy, employing more than one-third of the work force and generating the bulk of foreign exchanges. Industry and services have gradually gained a large share of GDP. Nevertheless, the economic development in Uganda at the present time appears to rely heavily on external donor support and finance through low-interest concessional loans.

In the period from 1990 to 2010, the economy in Uganda was growing at an average of 7% per year. It then slowed down to an average of 5.5% for the period of 2011 to 2014. It was further reduced to around 4% in 2016/17 due to a combination of tight financial conditions, the prolonged drought, and poor infrastructure. [1] Our estimates of the national parameters for Uganda are largely based on the data and the economic performance over the period from FY2008/9 to FY2016/17. Although the data in the FY 2016/17 may be still preliminary, it is also included in measuring the EOCK but not

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[1] Bank of Uganda (June 2017).

in the analysis of the FEP and the NTP due to a shortage of certain expenditure category of data required for the estimation.

2 Measurement of the Economic Opportunity Cost of Capital

2.1 Alternative Approaches

Choosing a discount rate used for the time value of the costs and benefits from the viewpoint of society has been one of the most contentious and controversial aspects of the economic or cost-benefit analysis of investment projects.[2] It is similar to the concept of the private opportunity cost of capital used to discount a stream of net cash flows of an investment project, but the implications can be more complex. With costs and benefits expressed in real values, people prefer to make payments later and receive benefits sooner because of a time preference for current consumption to future consumption. Similarly, there is an opportunity cost of the resources invested in any given activity as they could have been invested elsewhere if not being spent on this activity being evaluated.

Three alternative approaches to discounting have been generally suggested. One is based on the time preference of consumption. Following this approach, however, all benefits and costs should be converted into quantities of consumption equivalents before being discounted. This is tricky empirically and rarely contemplated in practice.

The second approach considers what society forgoes in terms of pre-tax returns of displaced investment in the country. The rationale is that if the government wants to invest or to be involved in the project, it must earn return no less than the projects being displaced. Using this approach, however, no account is made for time preference in terms of present versus future consumption. The discount rate is based purely on the opportunity cost of forgone investments.

The third approach captures the essential features of the above two alternatives by using a weighted average of the gross-of-tax rate of return on private investment and the time preference rate for consumption. Many professionals have chosen to use this concept to estimate the discount rate for a country. What follows is to describe this approach and empirically measure the economic cost of capital for Uganda.

2.2 Analytical Framework

The weighted average opportunity cost of funds has been considered most appropriate approach under a wide range of circumstances to a discount rate. For most countries, there exists a functioning capital market. Hence, when funds are raised in capital markets to finance any projects, the cost of funds will tend to rise slightly. In response to the higher cost of funds in the economy, the project funds will be ultimately diverted from three alternative sources. First is the funds that would have been invested in other domestic investment activities are postponed or displaced by the expenditures required to undertake the project in question. The cost of these funds from a national perspective

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[2] More theoretical arguments can be found in literatures, e.g., Sandmo and Dreze (1971), Harberger (1972), Spackman (2010), Burgess (2013), Burgess and Zerbe (2013), Harberger and Jenkins (2015).

is the gross-of-tax return that would have been earned on the alternative investments in the economy where the tax refers to property taxes and business income taxes.

The second source of funds comes from domestic savers because of the opportunity to earn a higher return on their savings. The economic cost is measured by forgone consumption of savers.

The third source of funds comes from additional foreign capital inflows due to a higher rate of return in the home country. The cost in this case should be measured by the marginal cost, which is not only the cost of serving the additional foreign funds, but also the extra financial burden of serving all other foreign financing where the cost of this financing is responsive to the market interest rate.

In short, the EOCK can be estimated as a weighted average of the economic opportunity cost of funds from the above three alternative sources. The weights are the shares of the funds derived from investors and savers in their response to a change in market interest rate as a result of funds being raised in capital markets. This can be written as follows:

$$EOCK = f_1 * \rho + f_2 * \gamma + f_3 * MC_f \tag{1}$$

where ρ stands for the gross-of-income tax return on domestic investment, γ for the economic cost of domestic savings, and MC_f for the marginal cost of incremental capital inflows from abroad; f_1, f_2, and f_3 are the corresponding sourcing fractions associated with displaced investment, domestic savings and capital inflows from abroad as a result of funds raised in the capital market. The sum of f_1, f_2, and f_3 is equal to one.

To facilitate empirical estimation, the weights are often expressed in terms of the elasticities of demand and supply of funds with respect to interest rate. Equation (1) can be written as follows:[3]

$$EOCK = \frac{\varepsilon_r (S_r\ S_t) * \gamma + \varepsilon_f \left(S_f/S_t\right) * MC_f - \eta (I_t\ S_t) * \rho}{\varepsilon_r (S_r\ S_t) + \varepsilon_f \left(S_f/S_t\right) - \eta (I_t\ S_t)} \tag{2}$$

where ε_r is the supply elasticity of domestic savings, ε_f is the supply elasticity of foreign funds, η is the elasticity of demand for domestic investment with respect to changes in the interest rate, S_t is the total private-sector savings available in the economy, of which S_r is the contribution to the total savings by residents, S_f is the contribution of net foreign capital inflows, and I_t is the total private-sector investment.

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[3] See, e.g., Jenkins, Kuo, and Harberger (2014), Chapter 8.

2.3 Empirical Estimation

Uganda is considered as an open economy and well-integrated in the global capital market. According to national accounts by Uganda Bureau of Statistics, trades accounted for an average of 48.31% of GDP over the past eight years, ranging the lowest 45.54% in 2013/14 to the highest 52.49% in 2011/12.[4] Also, various financial institutions in Uganda have been established. Its financial market is developed.[5] There is no control in foreign exchange. The interest rates and foreign exchange rates are all market determined.

Following the framework presented in Section 2.2, we begin by estimating the economic cost of each alternative source of funds in equation (1). The cost will be expressed as a percentage of the stock of reproducible capital.

2.3.1. The Economic Cost of the Three Diverted Funds

The Gross-of-Tax Return to Domestic Investment

The gross-of-tax return to domestic investment measures the contribution of capital investment in the economy as a whole. There are two alternative approaches to estimating this return to a country's reproducible capital. One is to sum all the returns to capital, including interest, dividend income, rent, profit income, as well as associated sales and excise taxes, which are recorded in the national accounts and then divide the total by the stock of reproducible capital.[6] The other approach is to begin with GDP net of depreciation and the contributions made by labor, land, and associated sales and excise taxes.[7] Both approaches depend on types of detailed data recorded in the national accounts. Data required for the former approach is generally not available in developing countries. The second approach is adopted for Uganda, with a great number of assumptions made to facilitate the estimation.

GDP in current prices for Uganda is publicly available from 2008/9 to 2016/17. Using this data, we need to exclude depreciation and the contributions made by labor, land, associated sales and excise duties in order to derive the return to capital. The first step is to estimate the contribution of labor to the economy, which is the sum of wages and salaries paid by corporations, government departments and unincorporated businesses. But none of these data are available from Uganda Bureau of Statistics. Using the median monthly wage at 168,000 shillings and the total employed population of 9.1 million persons reported by the 2016/17 Uganda National Household Survey data, the ratio of labor income to GDP was around 20.27%.[8] The estimate is understated because

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[4] These figures were calculated by the ratio of imports and exports to GDP.

[5] See, e.g., Bank of Uganda (June 2017); Mawejje and Munyambonera (February 2017).

[6] This approach was used for Canada by Jenkins and Kuo (2010).

[7] The approach was taken by Harberger for Uruguay (1977); Jenkins and Kuo for the Philippines (1998); and Kuo, Jenkins, and Mphahlele for South Africa (2003).

[8] This figure was calculated as the ratio of the multiplication of the average annual wage and the number of workers to GDP. For example, 20.27% =168*12*9.1/90,514) for 2016/17. See, Uganda Bureau of Statistics, *The 2016/17 Uganda National Household Survey* (September 2017).

of the exclusion of the workers in institutions, forest reserves, police and army barracks, and other special areas.

According to Uganda Bureau of Statistics, more than half of workforce has been engaged in the activities of the agricultural sector in the past eight years and the percentage share has been declining over years.[9] The productivity has been low due to limited access to appropriate technologies, lack of requisite skills by farmers, inadequate access to credit, and prolonged droughts.[10] On the other hand, the shares of the industry and service sectors in GDP have been increasing over the same period. But the size of firms tends to be small. In addition, the informal economy in Uganda is considerably large.

Based on an estimate of the 35% labor income in the value added of unincorporated businesses for South Africa during the period 1995-99,[11] we assume 33% for the base case in this study for the labor component of all incorporated and unincorporated businesses. A sensitivity analysis will be taken for this parameter later.

Second, land is considered a production factor along with capital and labor, especially in the agricultural and housing sectors. Forestry and fishing are generally lumped together with agriculture as a sector; this sector has been considered the most important sector in the Ugandan economy because of a high proportion of workforce and its capacity of generating nearly all of Uganda's foreign exchange earnings. But its share in GDP was drastically declined from 55.2% in 1986/87 to 38.7% in 2003/04. It was further declined each year from 27.35% in 2012/13, 26.96% in 2013/14, 25.96% in 2014/15, and 25.72% in 2015/16.[12] With the downward declining trend, we estimate the average of the shares of agricultural value added in total of the country for the unreported period from 2008/9 to 2011/12 as shown in Column (4) of Appendix A.

Crop farming, including coffee and food crop, accounts for an average of 58.76% of the value added in the agricultural sector over the period 2012/13 to 2015/16. [13] Assuming the contribution of land in the crop farming is one-third, we can estimate the contribution of land in the agriculture sector to GDP as shown in Column (6) of Appendix A. The one-third assumption is in line with estimates obtained in countries of a similar level of development.[14]

As regards the housing sector, no information is available on the amount of value added produced for the sector and thus it is not accounted for in this study.

The third component is the general sales taxes, excise duties and other taxes levied on international transaction on goods and services that are all part of GDP and considered

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[9] In the 2016/17 *Uganda National Household Survey*, the agriculture sector was reported to account for 36% of total employment in the country.

[10] Bategeka, Kiiza and Kasirye (May 2013).

[11] See, e.g., Kuo, Jenkins and Mphahlele for South Africa (2003).

[12] Details can be found in the footnotes of Appendix B. See Uganda Bureau of Statistics, AGDP Publication Tables FY 2016/17.

[13] See Uganda Bureau of Statistics, AGDP Publication Tables FY 2016/17 (November 2017).

[14] See, e.g., Robles (1997).

to be produced by both capital and labor. The exercise is to estimate the portion contributed by labor.

The general sales taxes implemented in Uganda are the consumption type value added tax (VAT) introduced in July 1996 to replace Sales Tax and Commercial Transaction Levy. The VAT rate has been at 18% since its inception. It is a multistage consumption tax based on the destination principle. The tax allows for a full credit for the purchase of business inputs at each stage including machinery, equipment and other capital goods. As a consequence, the tax is effectively levied on labor. Thus, the total collections of VATs by Treasury are excluded from GDP in order to derive the return to capital.

Excise duties are levied in Uganda on selected locally produced goods and services such as cigarettes, alcoholic beverages, soft drinks, cement, sacks and bags and other plastics, as well as airtime/service fee on cellular phones (see Column (8) of Appendix A). On imported goods, various levies are also imposed on specified products at the CIF prices in addition to import duty (see Column (9) of Appendix A). The total amount of these product taxes on labor's value added is assumed to be the same proportion as the share of labor income in GDP; they are estimated and subtracted from GDP in order to derive the return to capital alone. This is shown in Column (10) of Appendix A.

Depreciation is difficult to estimate in practice. In theory, it is measured by wear and tear of an asset and estimates of depreciation differ for different equipment. No estimates are available from Uganda Bureau of Statistics. We have estimated the amount of depreciation by assuming an overall depreciation rate at 2.5% of total capital stock for the base case, which is consistent with estimation of the total capital stock explained later.[15]

In a nutshell, a residual by subtracting from GDP the depreciation and the contributions to total value added by labor, land, VAT, and associated excise duties and other trade taxes borne by labor should yield the returns to capital. The results are presented in Column (12) of Appendix A. To get the rates of return to capital, we have to estimate the value of the stock of producible capital, including machinery, equipment, infrastructure, and buildings.

Uganda Bureau of Statistics does not provide estimates of capital stock. We use the database of Penn World Tables (PWT) version 9.0, which contains the measure of total capital stock for Uganda, based on the perpetual inventory method for each of the assets.[16] That is, given an initial or previous period capital stock, K_{t-1}, investment at constant prices I_t, and depreciation rate δ, the capital stock for the asset at time t, K_t, can be calculated as:

$$K_t = (1 - \delta) K_{t-1} + I_t$$

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[15] It should be noted that while the depreciation rate used to construct total capital stock is changed in sensitivity analysis, the amount of depreciation in GDP is also changed accordingly.

[16] See, e.g., Inklaar and Timmer (2013); Feenstra, Inklaar and Timmer (2014).

The methodology is applied to each of six assets including structures, transport equipment, computers, communication equipment, software, and other assets. The PWT estimates are the capital stock for Uganda in U.S. dollars on January 1 of each year from 2008 to 2014. However, the estimates for the total capital stock appeared to be very high in the U.S. dollars during the years of 2009, 2010 and 2011 (an annual increase of 17.1%, 17.6% and 21.3%, respectively). While being converted to Ugandan shillings and expressed in real terms, they are increased by 21.52%, 7.93% and 21.13% for the corresponding period.[17] The data in above estimated total capital stock during these years appears to have some issues related to inclusion of certain investment projects that had not actually taken place, and the problem is further compounded with highly volatile foreign exchange rates when converting to local currency.

For the purpose of this study, we use the PWT's estimates of January 1, 2008 and January 1, 2009 and take the mid-point as the total capital stock on July 1, 2008. That is, US$104,722.84 million, and converted to the local currency at 190,936.97 billions of shillings as the initial total capital stock. In the absence of different depreciation rate by asset, we estimate the total capital stock for the subsequent years by assuming an aggregate depreciation rate of 2.5% per year together with gross fixed capital formation. In general, the depreciation rate is higher for developed countries than developing countries. For example, the rate was estimated at 4.1% for the U.S. and 3.1% for China.[18] Details of constructing the total capital stock can be found in Appendix B. This 2.5% depreciation rate will be one of key parameters presented in the sensitivity analysis.

The total capital stock include non-remunerative portion of investment in the government public administration sector, which involves activities such as public security, national defense and public administration for which no valuation is made in the national accounts for the services they produce and needs to be excluded in order to derive reproducible capital. The non-remuneration refers to the buildings, machinery and equipment, research and development owned by governments. According to the World Bank, we have estimated the average ratio of gross fixed capital formation in private sector to the combined private and public sectors at approximately 77% over the period from 2008 to 2016. [19] In other words, the non-remunerative portion of investment is about 23% for Uganda.[20] This estimate is incorporated as shown in Columns (16) and (17) of Appendix A in order to estimate the rate of return to domestic investment.

The detailed computations for measuring the gross returns to domestic investment are shown in Appendix A. Over the past nine years, the average real rate of return to

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[17] Using the foreign exchange rates and GDP deflator published by the Bank of Uganda and the Uganda Bureau of Statistics, respectively, derives these estimates.

[18] See, e.g., Feenstra, Inklaar, and Timmer (2013).

[19] The annual ratios were estimated at 80.45%, 77.61%, 76.69%, 72.92%, 76.84%, 77.04%, 77.06%, 76.06%, and 77.06% from 2008 to 2016. See the World Bank (2016).

[20] This is similar to those for South Africa, in which the percentage of gross fixed capital investment by the general government in total investment ranged from 23.58% in 2008 declining to 22.00% in 2015. See South African Reserve Bank (December 2016).

domestic investment is 12.11%, ranging from 10.24% in 2008/9 to 13.07% in 2016/17. For the purpose of this analysis, we use 12.1 percent as the value of the economic rate of return on domestic investment, (ρ), in order to measure the EOCK for Uganda.

The Economic Cost of Domestic Savings

When funds are raised in the capital markets, the cost of funds will increase and stimulate additional domestic savings. These additional savings come at the expense of the current consumption that is postponed and can be considered as the economic cost of additional savings resulted from funds raised in the capital market.

This cost is measured by the gross-of-tax return to reproducible capital derived from the previous section minus the amount of corporate income taxes, presumptive taxes paid by small business entities, as well as rental income tax, tax on bank interest and other capital income taxes paid by businesses and individuals.[21]

It is further reduced by the cost of financial intermediations provided by banks, credits, and other deposit-taking institutions because these services are stimulated as a result of funds raised in the market. The financial intermediation services are the main activities in banks, credit unions and other financial institutions. For this study, we have assumed that the value added generated by commercial banks and credit institutions are mainly financial intermediation services while financial corporations and financial auxiliaries provide little financial intermediation services in Uganda.[22] It should be noted that the data we received from the Uganda Bureau of Statistics is value added of these financial intermediation institutions. Since the return to domestic investment estimated earlier has already removed labor compensation, [23] we only need to deduct the capital component of the financial intermediation services. Detailed calculations and formula are presented in Appendix C.

The end result is then divided by the stock of reproducible capital to yield the rate of return to domestic savings. Over the past nine years from 2008/9 to 2016/17, the average rate of return to domestic savings for Uganda is 11.32%, ranging 9.68% in 2008/9 to 12.04% in 2016/17. The estimate was derived beginning from the ex-post value of return to gross-of-tax income to capital previously estimated. It implies that the value contains the risk premium on a variety of investments over the study period and thus the risk premium needs to be removed in order to estimate the rate of time preference for consumption for society as a whole.

The treasury bills are considerably risk-free financial instrument. These bond yields have been declining over recent years because of lower inflation rates and other factors. According to the Bank of Uganda, the average yield in 2017 is about 9%, ranging from

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[21] Detailed capital income taxes paid by incorporated, small businesses, and individuals were obtained from the Ministry of Finance, Planning and Economic Development, (November 2017).

[22] The value added generated by various financial institutions are obtained from the Ministry of Finance, Planning and Economic Development, Paul MoFPED.xlsx, (November 2017).

[23] For the economy as a whole, the contribution by labor to GDP is assumed at 33% of GDP for the base case.

8.6% to 9.6% with an inflation rate at 5.0%.[24] Assuming the yield is subject to the personal income tax rate at 25%, the real rate of return to risk-free bonds would be about 1.67%. Suppose the average risk is somewhere between the previous estimate of 11.32%, which is net of all taxes associated all capital incomes received as profits, interest, dividend, mutual funds and so on, and the risk-free rate of 1.67%; that is 4.83% around the mid-point. Netting out this risk premium from the rate of return to domestic savings yields the rate of time preference for consumption at 6.49%. We will use 6.5% as the value of γ in the estimation of the EOCK.

The Economic Cost of Foreign Financing

The third component of the EOCK is the marginal cost of foreign financing. When projects funds are raised in the capital market, the market interest rates will increase and foreign funds are attracted to the market. As a result, the amount to service foreign obligations will rise. The cost of additional foreign funds is measured by not only the cost of serving the additional foreign borrowing but also the extra financial cost of serving all other existing foreign financing where the cost of this financing is responsive to the market interest rate.[25] This marginal cost of foreign fund can be measured as follows:

$$MC_f = [i_f*(1-t_w)- GP_f]/(1+ GP_f)*[1+\phi*(1/\varepsilon_s^f)] \qquad (3)$$

where i_f is the nominal interest rate on foreign borrowing by projects, t_w is the rate of withholding taxes charged on interest payments made abroad, GP_f is the foreign inflation rate, ϕ is the ratio of [the total foreign financing whose interest rate is flexible and will respond to additional foreign borrowing] to [the total amount of foreign borrowing and foreign direct investment], ε_s^f is the supply elasticity of foreign funds to a country with respect to the interest rate the country pays on its incremental foreign capital flows.

According to the World Bank,[26] Uganda has been receiving a substantial amount of foreign aids and external long-term loans to finance a variety of projects in the past. Over years, the cumulated long-term loans generated the total external public and private debt stocks from US$2,672.9 million in 2010 to US$4,873.4 million in 2015. Most of the long-term debts in Uganda are concessional loans that are normally set at fixed and lower than the market interest rate. These concessional loans are estimated to account for 83.0% to 87.9% over the past eight years, as shown in Appendix D. In other words, the loans with variable interest rates would range from 12.1% to 17.0% of total external debt.

Other main non-debt resource inflows are foreign direct investment, which has a component of debt capital in addition to equity capital and reinvested earnings. The debt capital is also considered part of external debt for the purpose of this study. Over

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[24] Bank of Uganda (June 2017).

[25] See, e.g., Jenkins, Kuo and Harberger (2014), Chapter 8.

[26] See, The World Bank, *2017 International Debt Statistics*, www.datatopics.worldbank.org.

the past eight years, the foreign direct investment (FDI) has increased steadily over years and the total stock of FDI ranged from US$5,575 million in 2010 to US$10,368.0 million in 2015. According to the Bank of Uganda, debt financing accounted for approximately 33% of the annual flows of the FDI in years 2014-16.[27] If the 33% is assumed for the debt financing of the total FDI stock, it should be combined with non-concessional external long-term debt stock to yield the total foreign debt whose market interest rate is flexible and will respond to additional foreign financing to the total stock of foreign financing for Uganda. The ratio is estimated at approximately 28% of the total stock, which consists of external long-term debt and FDI. In other words, the 28% is used for ϕ in equation (3). Detailed computations are presented in Appendix D.

According to the Bank of Uganda, interest rates on the U.S. dollar denominated loans have declined over recent years to 8.2% in May 2017.[28] For this study, we use the average rate of approximately 13.9% (i_f) over the past six years with the GDP deflator of 2% in the United States.[29]

The other two parameters needed for equation (3) are the withholding tax and the supply elasticity of foreign funds. In Uganda, the withholding tax levied on interest received by non-residents is 15%. However, a lower rate at 10% is applicable to some countries with tax treaty agreements such as Netherlands, India, South Africa, and Mauritius. Since these countries accounted for more than a half of the foreign loans,[30] an average rate of 12.5 percent is assumed for the purpose of this study. As regards the supply elasticity of foreign capital inflows with respect to market interest rates, it is assumed at 2.0.

Using the parameters and assumptions described above, we can estimate the value of the marginal cost of foreign financing at approximately 11.36%. We use 11.4% for MC_f.

2.3.2. Shares of Alternative funds to Finance Investment Projects

The EOCK is estimated as a weighted average of the gross-of-tax rate of return to domestic investment, the cost of forgone consumption due to additional domestic savings, and the marginal cost of foreign capital inflows. The cost for each of the three funds was estimated in Section 2.3.1. According to equation (2), the weighs associated with each of source of funding at the margin depend upon the initial share of each source, the ratio of investment to saving in the private sector, and the response of each fund to the change in interest rate as a result of borrowing in the capital market.

No data are readily available for these three parameters in Uganda. Each of them needs to be derived indirectly or assumed. Over years government budget has been in deficit, ranging from 0.92% of GDP in 2009 to 4.9% in 2016. The cumulated public debt has

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[27] It was estimated at 33.08% for 2014 and 32.92% for 2016.
[28] Bank of Uganda (June 2017).
[29] This rate is higher than 13% assumed for Rwanda in Cambridge Resources International Inc. (July 2014). A reporter indicated that the borrowing rates by Ugandan firms were higher than that for Kenya and Tanzania. See, e.g., Sanya (September 6, 2013).
[30] In 2015, it accounted for 65%.

increased from 19.2% of GDP to 36.9% over the same period.[31] One would expect that public-sector investment must be financed in part by private-sector savings. Using the 2016 figures, the public debt would account for approximately 9.3% of the reproducible capital, which must be financed by the private savings.[32] This implies that the ratio of the private-sector investment to the private-sector savings would be approximately 0.9, which is used for (I_t/S_t) in the analysis.

The amount of foreign capital inflows includes foreign direct investment and external long-term debt. The total amount was US$15,241.4 million in 2015, which is equivalent to 47,752.7 billions of shillings (see Appendix D).[33] This amount was financed through foreign savings. The ratio of this foreign financing to total reproducible capital is about 15.36%. If accounting for external short-term loans, the percentage (S_f/S_t) would be adjusted upward to approximately 15.5% and the remaining 84.5% would be financed by domestic savings, namely for (S_r/S_t).

Lastly, we also need to specify demand and supply elasticities of each fund with respect to the market interest rate according to equation (2). Following international empirical studies, we assume that demand elasticity for domestic private-sector investment of -1.0, the long-run supply elasticity of domestic savings of 0.4, and the supply elasticity of the stock of foreign funds of foreign savings of 2.0. With these assumptions, one can derive the proportions of funds diverted from three alternative sources to finance investment projects as a result of raising funds in the capital market. They are 21.83% from domestic savings, 20.03% from foreign capital, and 58.14% from displaced or postponed domestic investment.

2.3.3. Estimates for the EOCK

The EOCK can be estimated as a weighted average of the rate of return (or the opportunity cost) of each fund multiplied by the corresponding weight derived from the previous two sections. Substituting these figures in equation (2), one will obtain an estimate of the economic cost of capital for Uganda of 10.74 percent.

2.3.4. Sensitivity Analysis for the EOCK

One of the challenges for measuring the EOCK for Uganda relates to the availability of data required for estimation. When the data are not available, they are based on our observation of the economic indicators elsewhere. The empirical results in the base case depend on the values of several key parameters, including the share of labor income in GDP, the depreciation rate used for existing total capital, the percentage share of non-remunerative portion of investment in total capital stock, the elasticity of foreign capital inflow, and the expected interest rate of foreign funds borrowed for investment projects

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[31] The ratio of the public debt to GDP in Uganda had increased from 19.2%, 22.4%, 23.4%, 24.3%, 27.2%, 30.1%, and 33.2% to 36.9% over the period from 2008 to 2016.

[32] This is calculated as the ratio of 0.369*[(84,448+90,514)/2]/[(330,389+363,302)/2], using the average of the latest two years' data. See Appendix A.

[33] The exchange rate on January 1, 2015 would be approximately 3,133.09 shillings per U.S. dollar, which was estimated at the mid-point of 2823.22 and 3,442.96 shillings per U.S. dollar of two subsequent years on July 1.

in Uganda. We conduct a sensitivity analysis regarding the impact of these key parameters on the estimate of the economic opportunity cost of capital.

The Share of Labor Income in GDP

If the proportion of labor income in GDP is 30% instead of 33% assumed for the base case, the real rate of return to domestic investment would be raised on average to 12.96% over the past nine years and the time preference of consumption to 6.91%.[34] Using 13.0% for ρ, 6.9% for γ, and 11.4% for MC_f, the EOCK becomes about 11.35 percent, 0.61 of a percentage point higher than that for the base case.

If proportion of labor income in GDP is further reduced to 27%, the parameters ρ and γ are recalculated to be 13.80% and 7.32%, respectively. Other things being equal, substituting these values and 11.4% for MC_f in equation (2) yields the EOCK for Uganda at 11.90 percent, which is 1.16 percentage points higher than that for the base case.

On the other hand, if the portion of labor income in GDP is higher at 35%, the average rate of return to domestic investment and the time preference of consumption would be reduced to 11.55% and 6.21%, respectively. As a consequence, the EOCK decreases to 10.38 percent, 0.36 of one percentage point lower than that for the base case.

Depreciation Rate

If the aggregate depreciation rate used for total capital stock is 2.0% instead of 2.5%, it will impact not only on the estimate of total capital stock for subsequent years but also on the amount of depreciation in order to estimate the return to domestic investment each year. The parameters ρ and γ are calculated to be 12.49% and 6.69%, respectively. Substituting these opportunity costs of funds along with 11.4% for MC_f in equation (2) yields the EOCK at 11.01 percent.

On the other hand, if the aggregate depreciation rate is assumed higher at 3.0%, the values of ρ and γ are estimated lowered at 11.75% and 6.30%, respectively compared to the previous cases. Accordingly, the EOCK would be slightly reduced to 10.46 percent, 0.28 of one percentage point lower than that for the base case.

Reproducible Capital

If the share of non-remunerative portion of capital stock in the government public administration is adjusted upward to 25% of total capital stock from the base case at 23%, the average rate of return to domestic investment rises to 12.44%, so does the time preference of consumption to 6.65%. Using 12.4% for ρ, 6.7% for γ, and 11.4% for MC_f, the EOCK is estimated at about 10.96 percent, 0.22 of a percentage point higher than that for the base case.

Two more cases are further simulated, one is the share of non-remunerative portion of

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[34] We first calculate the average rate of return on domestic savings over nine years (9.44%). Following the same procedure as the base case, we calculate the risk premium at 3.88%, which is the mid-point of 9.44%, gross of risk premium and 1.67%, yield of risk-free treasury bills.

capital stock in the public administration adjusted upward to 30% and the other is adjusted downward to 20%. The EOCK for the former case would be 11.57 percent while for the latter case it would be 10.46 percent.

The Supply Elasticity of Foreign Capital

It the supply elasticity of foreign capital is 3.0 rather than 2.0, the share of financing from foreign funds becomes larger to 27.30% from 20.03% but the marginal cost of foreign funds is decreased to 10.89% from 11.36% according to equation (3). As a result, the EOCK increases slightly to 10.66 percent from 10.74 percent for the base case.

On contrary, if the supply elasticity of foreign capital is decreased to 1.5, the EOCK would be 10.62 percent, only 0.12 of one percentage point lower than that for the base case because of the lower share of foreign financing with a bit higher marginal cost of foreign capital.

The U.S. Dollar Denominated Loan Interest Rates

If the U.S. dollar denominated interest loan is 13.0% instead of the historical average of 13.9%, the marginal cost of foreign financing would be 10.48% according to equation (3). This suggests that other assumptions being unchanged, the EOCK would be lower to 10.56 percent, 0.18 of a percentage point lower than the base case.

Suppose the foreign currency denominated interest loans is 10.00%, the marginal cost of foreign capital would be 7.54%. The EOCK for Uganda would be 9.96 percent, 0.78 of a percentage lower than the base case.

From the above sensitivity analyses, we find the estimates of the ECOK range from 9.96 percent to 11.90 percent as shown in Table 1. The results appear to center around 10.5 percent and 11.0 percent. Given the data obtained and used for the analysis, these results suggest that a 11 percent real rate is an appropriate and the conservative discount rate to be used to discount annual real resource costs and economic benefit over the life of an investment project.

Table 1: Results of Sensitivity Analysis for the EOCK for Uganda

Scenarios	Key Assumptions	EOCK
Base Case	- Share of Labor Income in GDP: 33%; - Aggregate Depreciation Rate: 2.5%; - Non-remunerative/Total Capital Stock: 23%; - Supply Elasticity of Foreign Capital: 2.0; - U.S. Dollar Denominated Interest Rate: 13.9%.	10.74%
Sensitivity Analysis:		
- Share of Labor Income in GDP	- 27% - 30% - 35%	11.90% 11.35% 10.38%
- Aggregate Depreciation rate	- 2.0% - 3.0%	11.01% 10.46%
- Non-remunerative/Total Capital Stock	- 20% - 25% - 30%	10.46% 10.96% 11.57%
- Supply Elasticity of Foreign Capital	- 3.0 - 1.5	10.66% 10.62%
- U.S. Dollar Denominated Loan Interest Rate	- 13.0% - 10.0%	10.56% 9.96%

3 Measurement of the FEP and NTP

The second national parameter used in the evaluation of investment projects is the foreign exchange premium (FEP) and the premium for non-tradable outlays (NTP). These premiums are generated because of trade and other indirect tax and subsidy distortions at the point in time that the funds are raised in the capital market and spent on tradable and non-tradable goods. They are best expressed as a percentage of the market foreign exchange rate and the financial value of non-tradable goods, respectively so that they can be easily incorporated in the economic evaluation of project projects from the analysis of the financial evaluation.[35]

3.1 Analytical Framework

The conceptual framework employed to measure these premiums is based on a three-sector general equilibrium model in an economy developed by Harberger and Jenkins.[36] The three sectors of this model consist of importable, exportable, and non-tradable goods. Both importable and exportable goods are part of tradable goods. This framework was further developed by Kuo, Salci, and Jenkins into an operational guide and empirically applied to a number of countries in Africa.[37] This model is employed here to measure the FEP and the NTP for Uganda.

Uganda is an open and integrated into the world financial market and the economy. When project funds are sourced in the capital market, they are sourced domestically as well as abroad, as described in Section II. If funds are sourced domestically and used to purchase a project's tradable goods, there will be a displacement or postpone of domestic investment and consumption expenditures, which reflect a reduction of demand for domestic tradables and non-tradables. The net result is an excess demand for tradables and excess supply of non-tradables in the economy. The consequence is forgone indirect taxes and subsidies associated with changes in the above expenditures, which reflects an increase in welfare cost of using the foreign exchange to purchase tradable inputs (i.e., $\Delta"\#_{t,d}$).[38]

This will not be the case, however, when funds are sourced abroad and spent on tradable goods since there is no excess domestic demand for foreign currency, nor is an excess demand for domestic currency and expenditures in the economy. Thus, no additional welfare cost will occur. That is, $\Delta"\#_{t,f} = 0$.

Although project funds are initially raised in the domestic market, they will ultimately end with funds sourced domestically and abroad when equilibrium is re-established.[39]

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[35] See, e.g., Jenkins, Kuo, and Harberger, (October 2014).

[36] Harberger, and Jenkins, (2002). A diagrammatic and numerical illustration can be found in Jenkins, Kuo, and Harberger (October 2014).

[37] Kuo, Salci, and Jenkins, (June 2015).

[38] Detailed explanation can be found in Kuo, Salci, and Jenkins (June 2015).

[39] Conceptually, this outcome will be the same regardless whether initial capital market borrowing occurs in the domestic or the foreign market. See Jelliss and Kuo (1987).

Hence, the impacts of the two market operations create a net welfare cost, which is termed the FEP and can be calculated in a weighted average as follows:

$$FEP = \$_d \cdot \Delta''\#_{t,d} + \$_f \cdot \Delta''\#_{t,f}$$

$$= \$_d \cdot \Delta''\#_{t,d} \qquad (4)$$

where $\$_d$ and $\$_f$ stand for the proportions of funds sourced domestically and abroad, respectively.

When project funds are raised in the domestic market but spent on non-tradable goods, the excess demand for non-tradables and excess supply of tradables would occur and generate a net welfare cost. However, if foreign funds are used to spend on non-tradable goods, there is no initial displacement of investment and consumption of tradables and non-tradables owing to the capital extraction. Thus, the excess demand for non-tradables and excess supply of tradables will be greater than the previous case because of a larger impact on real exchange rate when a new equilibrium is established. The net welfare cost (or NTP) in the economy can be measured by the weighted average of the changes in economic welfare as a result of funds either sourced in the domestic market ($\Delta''\#_{nt,d}$) and the foreign market ($\Delta''\#_{nt,f}$):

$$NTP = \$_d \cdot \Delta''\#_{nt,d} + \$_f \cdot \Delta''\#_{nt,f} \qquad (5)$$

3.1.1. Measuring the Foreign Exchange Premium

To measure the FEP and the NTP, the first is to find out the proportions of project funds sourced domestically and abroad (i.e., $\$_d$ and $\$_f$) and to estimate various welfare costs associated with each sourced fund. The proportions of project funds have been dealt with in Section II. This section focuses on how each of the welfare costs can be estimated.[40]

We begin with the net welfare cost when funds are extracted from the domestic capital market to finance the purchase of tradable goods; and then the consequential effect (i.e., substitute effects) will take place due to the impact of changes in the relative price of tradable to non-tradable goods. First, when project funds are extracted from the capital markets, this act will reduce the expenditures made by other businesses and consumers on tradables and non-tradables. The decrease in the demand for tradables and non-tradables will reduce the amount of value added tax (VAT) as well as excise taxes on specific goods and services. In the case of VAT, businesses will be credited for the tax paid on the purchases of business inputs to offset the VAT liabilities from their sales. As a result, only (1- ($_i$) of the displaced expenditures will affect VAT payments, where ($_i$ refers to the proportion of expenditures during the capital market extraction that is excluded from VAT because of the input tax credit.

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[40] Most of this section and Sections 3.1.2 are taken from Kuo, Salci and Jenkins (2015). It is presented here for the benefit of readers.

The effective VAT rates are different between tradable and non-tradable goods because the portions of their respective goods excluded from VAT differ considerably. If v_t and v_{nt} stand for the effective VAT rates on the demand for tradables and non-tradables, respectively, only v_t $(1-(_i)$ and v_{nt} $(1-(_i)$ of the displaced expenditures from the capital market operation will affect the tax payments. This is shown in the first two terms of equation (6), where $\partial Q_{d,t} \mid \partial F^D$ and $\partial Q_{d,nt} \mid \partial F^D$ are the reductions in the demand for tradables and non-tradables as a result of funds sourced through the domestic capital market extraction, ΔF^D. Using the domestic currency as numeraire, the real exchange rate, E, reflects the relative price of tradable to non-tradable good.

$$\bigotimes_{W} E = {}^{*\exists}v\left(1-\rho\right)\frac{\partial Q_{d,t}'}{\partial F^D}\,E + {}^{\exists}v \quad 1-\rho\,\frac{\partial Q_{d,nt}'}{\partial F^D}\,{}^{\exists} \quad \frac{\partial Q_{d,nt}'^{-}}{\partial F^D}\,dF^D \tag{6}$$

In the case of excise duty imposed on selected goods, they are not creditable even if purchased for businesses. This effect is captured in the third term of equation (6). Thus, ΔEW_1 captures the total impact on the welfare cost that is due to changes in VAT and excise duties collected over the process of the extraction of funds from the domestic capital market.

If the sourced funds are totally spent on tradables, this will initially create a net excess demand for tradables and a net excess supply of non-tradable goods in the economy. This disequilibrium situation will cause a rise in the relative price of tradables to non-tradables; the process will continue until a new equilibrium is reached in which no excess supply exists in the tradables sector owing to adjustments of the real exchange rate. The resources required to produce the additional tradables will come from the reduction in the production of non-tradables. Equilibrium is again established when the sum of the total demand for tradabes ($Q_{d,t}$) and non-tradables ($Q_{d,nt}$) equals the total supply of tradables ($Q_{s,t}$) and non-tradables ($Q_{s,nt}$) plus any of the trade deficit that is financed in the form of remittances, foreign aids and foreign investment.

Given the resource constraint, the above mechanism operates through the adjustment in the real exchange rate.[41] As a consequence of the adding-up properties of demand in a two-good economy, the compensated own-price elasticity of demand for tradables $\left(\eta^d\right)$ must be equal to the compensated cross-price elasticity of demand for non-tradables $\left(\eta_n^d\right)$ times the ratio of the demand for non-tradables to tradables ($Q_{d,nt}/Q_{d,t}$). Similarly, for the supply side, the own-supply elasticity (ε_t^s) should be equal to the cross-supply elasticity of non-tradables (ε_n^s) multiplied by the ratio of the supply of non-tradables to tradables ($Q_{s,nt}/Q_{s,t}$).

Since the change in the real exchange rate is required to restore equilibrium in the markets, a change in welfare cost will come about by the interaction of tax and subsidy distortions with the changes in the quantities demanded and supplied. These

[41] Alternatively, there will be an excess supply of tradable goods if the funds are all spent on non-tradable goods. The case will be presented in the next section.

substitution effects on the welfare cost can be measured by equation (7). The first term refers to the change in VAT collected and subsidy on production in the tradable goods while the second term is the change in VAT and excise taxes collected and subsidy on production in the non-tradable goods sector.

$$
\Delta E W_2 = \sum_t \left[\frac{v_t(1-\rho_s)\eta^d_t}{\varepsilon^s_t - \eta^d_t} - \frac{k_t \varepsilon^s_t}{\varepsilon^s_t - \eta^d_t} \right] (E + \sum_{nt} \left[\frac{v_{nt}(1-\rho_s)\eta^d_{nt}}{\varepsilon^s_{nt} - \eta^d_{nt}} + \frac{t_{e,nt}\eta^d_{nt}}{\varepsilon^s_{nt} - \eta^d_{nt}} - \frac{k_{nt}\varepsilon^s_{nt}}{\varepsilon^s_{nt} - \eta^d_{nt}} \right] \frac{Q_{d,nt}}{Q_t} \left(1 + \frac{\partial Q_t}{\partial F^D} \right) (dF^D \quad (7)
$$

where K_t and K_{nt} are the production subsidies on tradables and non-tradables,

respectively; and ρ_s is the proportion of the changes in demand resulting from the

exchange rate adjustment that are excluded from VAT.

In addition to the domestic VAT and excise taxes, there are other external trade distortions, such as import duties, excise duties, and export taxes associated with changes in imports and exports. The effects of these changes on welfare cost over the capital extraction are measured by the third component (ΔEW_3):

$$
\Delta EW_3 = \sum_t \left[t_m \frac{\partial Q_{d,i}}{\partial F^D} + t_e(1+t_m)\frac{\partial Q_{d,i}}{\partial F^D} + t_x \frac{\partial Q_{d,e}}{\partial F^D} \right] (E) dF^D \quad (8)
$$

where t_m is the effective import duty rate, t_x is the effective export tax rate, t_e is the effective excise tax rate on tradable goods. $Q_{d,i}$ is the demand quantity of importable goods and $Q_{d,e}$ is the quantity of exportable goods demanded domestically.

The fourth component (ΔEW_4) accounts for welfare cost caused by trade distortions due to the substitution effects. This can be measured in equation (9):

$$
\Delta EW_4 = \sum_t \left[\frac{t_m \eta^d_t (Q^d_M / Q_M)}{\varepsilon^s_t - \eta^d_t} + \frac{t_e(1+t_m)\eta^d_t(Q^d_M / Q_M)}{\varepsilon^s_t - \eta^d_t} - \frac{t_x \varepsilon^s_t (Q^s_X / Q_X)}{\varepsilon^s_t - \eta^d_t} \right]_{d,t} (E) \left[1 + \frac{\partial Q_{d,t}}{\partial F^D} \right] dF^D
$$

$$
(9)
$$

where ε^s_X is the own-price supply elasticity of exports, η^d_M is the own-price demand elasticity of imports, Q^s_X is the amount of exports, and Q^d_M is the amount of imports.

Suppose the amount of funds raised in the economy is one unit of foreign country, the FEP can be measured by substituting the welfare costs calculated from equations (6),

(7), (8) and (9) into equation (4) as follows:

$$\text{FEP} = \$_d \cdot [\; \Delta EW_1 + \Delta EW_2 + \Delta EW_3 + \Delta EW_4\;] \tag{10}$$

3.1.2. Measuring the Premium for Non-tradable Outlays

The NTP is a premium equivalent to the FEP that is associated with non-tradable outlays. It is the amount in which the economic cost of non-tradable outlays exceeds the financial outlays. What follow is to estimate the forgone taxes or welfare cost as a result of raising each of the funds sourced either domestically or abroad.

Domestic Funds are Spent on Non-tradable Goods

In this case, the initial impacts of the capital extraction will have the same effects as expressed in equations (6) and (8) for the estimation of the FEP.

When funds are spent on non-tradables, there will be an excess demand for non-tradables and an excess supply of tradables. This will cause the relative price of non-tradables to tradables to increase. The adjustment process will continue until the excess demand for non-tradables is eliminated.

The impacts on economic welfare due to the substitution effects are two-fold. First is the change in welfare cost ($\otimes EW_5$) associated with changes in the demand and supply of tradable goods whose markets contain domestic indirect taxes and production subsidies and the second effect (ΔEW_6) is associated with changes in imports and exports that are subject to external trade taxes. They can be measured as follows:

$$\otimes EW_5 = + \% \left[\frac{v_t \left(1-\rho_s\right)\eta_t^d}{\varepsilon_t^s - \eta_t^d} \cdot \frac{k \varepsilon_t^s}{\varepsilon_t^s - \eta_t^d} \left(E + \%^{nt} \right) - \frac{v_t \left(1-\rho_s\right)\eta_{nt}^d}{\% \frac{}{\varepsilon_t^s - \eta_t^d}} + \frac{e,nt}{\varepsilon_t^s - \eta_t^d} \cdot \frac{\eta_t^d}{\varepsilon_t^s - \eta_t^d} \cdot \frac{nt_{nt}}{\% Q} \left(\% - \frac{k \varepsilon_t^s}{\varepsilon_t^s - \eta_t^d} \cdot \frac{d,nt}{} \right) \left(.\% \frac{\partial Q_t}{\partial F_{d,t}^D} \right) dF^D \right]$$

(11)

$$\otimes EW_6 = ' \left[\frac{t_m \eta^d \left(Q^d / Q_M\right)_{d,t}}{\varepsilon_t^s - \eta_t^d} + \frac{t_e \left(1+t_m\right)\eta^d \left(Q^d / Q_M\right)_{d,t}}{\varepsilon_t^s - \eta_t^d} - \frac{t_x \varepsilon^s \left(Q^s / Q_X\right)_{s,t}}{\varepsilon_t^s - \eta_t^d} \right] \infty (E) \left[\frac{\partial Q_{d,t}}{\infty \partial F^D} \right] dF^D_f$$

(12)

The total welfare cost in this case can be measured by the sum of ΔEW_1, $\otimes EW_3$, $\otimes EW_5$ and $\otimes EW_6$.

Foreign Funds are Spent on Non-tradable Goods

When foreign funds are sourced, there is no impact on the domestic economy. Until the funds are spent on non-tradables, an additional demand for non-tradables will cause an increase in the relative price of non-tradables to tradables. The impact in this case is greater than when funds are sourced domestically and spent on non-tradables, since there is no initial displacement of domestic investment and consumption in non-tradable goods to be offset. Consequently, the supply of non-tradables will expand much more, demanding greater resources to come to the sector from the tradable good

sector.

There is only substitution effect in this case. These effects can be separated into two parts. The first is the change in welfare cost ($\otimes EW_7$) associated with changes in

quantities of items that have domestic taxes and production subsidies levied on them while the second part ($\otimes EW_8$) is the change in trade taxes associated with the changes

in demand and supply of tradable goods when these goods cross borders. These effects can be calculated as equations (13) and (14), respectively:

$$\otimes EW_7 = +\%_t \left[\frac{v(1-\rho)\eta^d_t}{\varepsilon^s_t - \eta^d_t} - \frac{k\varepsilon^s_t}{\varepsilon^s_t - \eta^d_t} \right] (E + \%_{nt} \ldots) + \frac{v(1-\rho)\eta^d_t}{\varepsilon^s_t - \eta^d_t} + \frac{e,nt}{\%} \ldots - \frac{nt}{\varepsilon^s_t - \eta^d_t} \frac{\eta^d}{\varepsilon^s_t - \eta^d_t} \ldots \int dF^F$$

(13)

$$\otimes EW_8 = \int \left[\frac{\eta^d_t (Q^d/Q)}{\varepsilon^s_t - \eta^d_t} \right]_{d,t} + \left[\frac{t(1+t)\eta^d_t(Q^d/Q)}{\varepsilon^s_t - \eta^d_t} \right]_{d,t} - \left[\frac{t\varepsilon^s_t(Q^s/Q)}{\varepsilon^s_t - \eta^d_t} \right]_{s,t} \ldots \int dF^F$$

(14)

The total welfare cost in this case is simply the sum of $\otimes EW_7$ and $\otimes EW_8$.

Since the funds used for the projects are sourced domestically as well as abroad, the NTP should be estimated as a weighted average of the welfare costs associated with each source of funds. This can be done by substituting the welfare costs calculated from equations (6), (8), (11), (12), (13) and (14) into equation (5). That is:

$$\text{NTP} = \$_d \cdot \Delta''\#_{nt,d} + \$_f \cdot \Delta''\#_{nt,f}$$

$$= \$_d \cdot [\ \Delta EW_1 + + \Delta EW_3 + \otimes EW_5 + \otimes EW_6\ ] + \$_f \cdot [\ \Delta EW_7 + \Delta EW_8\ ]$$

(15)

3.2. Empirical Estimation

The analytical framework and formulas for measuring the FEP and NTP was presented in the previous section. We need to estimate all variables shown in the formula for Uganda. They can be grouped in four categories. The first is the proportion of funds sourced domestically and abroad in order to finance the purchase of tradable and non-tradable goods. The second is the relative sizes of tradable and non-tradable goods in order to measure the interrelated impacts between tradable and non-tradable sectors. The third is the demand and supply elasticities of imports, exports and non-tradable goods with respect to the real exchange rate. The last is the effective tax rate for each of the major indirect taxes and the effective rates of production subsidies.

3.2.1. Alternative Sources of Funds

As shown in Section II, when funds are raised in the capital market in Uganda, the proportions of funds diverted to finance investment projects in the base case are 21.83%

from household savings, 58.14% from displaced domestic investment, and 20.03% from foreign savings. The first two components constitute domestic sources of funds while the third component represents the foreign source of fund. In other words, $\$_d$ and $\$_f$ are approximately 80% and 20%, respectively for equations (4) and (5).

3.2.2. Tradables vs Non-tradables

The relative size of tradable and non-tradable goods in the economy has important

implications for the FEP and the NTP because of different scope of VAT and other product taxes imposed on these goods and services. At present, agriculture and industry sectors account for 25.0% and 19.6% of GDP, respectively in Uganda.[42] Virtually all of these products are moveable and tradable. The service sector is the biggest sector in which trade, restaurants, hotels, information and communication, professional services and associated transportation and food service activities account for approximately 25% of GDP and many of these services are closely related with tradable goods. For the country as a whole, we have estimated that the tradable and non-tradable goods in Uganda are approximately two-thirds and one-third, respectively. This is in line with an estimate based on the economy for South Africa using data with detailed commodity breakdown.[43]

Uganda has exhibited a systemic trade deficit for years. The amount of imports in Uganda is on average larger than exports by 63% over the past eight years. This suggests a much greater share of the demand for importables than exportables in total tradables. For the purpose of this study, the importable demand is assumed to account for 80% of the total tradable demand in an economy, while the supply of importables is assumed to be 35% of the total supply of tradables.[44] This implies that the proportion of the domestic demand and the supply of exportables in the total demand and supply of tradables would be 20% and 65%, respectively.

As regards the impact on the economy of the capital extraction alone, the share of the demand for importables in total demand for tradables will be greater than the 80% assumed for the economy as a whole because tradable goods make up a large share of total investment. In Uganda, of the displaced investment business inputs such as truck and other vehicles, machinery and other base metal are all imported; thus 90% of displaced investment is assumed to be importable. According to Section II, about 27.3% of funds are sourced from the displacement of investment and 72.7% from consumption forgone in response to stimulated household savings over the capital extraction. Hence, about 87% of the total change in the demand for tradables caused by the capital market extraction would be importable.[45]

3.2.3. Demand and Supply Elasticities

The demand and supply elasticities of tradable or non-tradable goods are important for quantifying the response of their demand and supply to the relative price of tradable to non-tradable goods (i.e., the change in the real exchange rate). As was mentioned earlier, given the resources available in the economy, in order to ensure the market equilibrium the derived compensated own-price elasticity of demand for tradables must be equal to the compensated cross-price elasticity of demand for non-tradable

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[42] Uganda Bureau of Statistics, *AGDP Publication Tables, FY 2016/17*, (November 2017).

[43] See, e.g., Harberger, Jenkins, Kuo and Mphahlele (2003).

[44] The supply of importables in Uganda is assumed smaller than 40% for South Africa because of a lesser open and economic development in Uganda. See, Kuo, Salci and Jenkins (2015).

[45] This is estimated as a weighted average of importables as a share of total demand for tradables of both household consumption expenditures and business investment. That is, 87.27% = (0.2183* 80% + 0.5814*90%)/(0.2183 + 0.5814) = 0.273*80% + 0.727*90%.

multiplied by the ratio of the demand for non-tradables to the demand for tradables. The cross-price elasticity of supply of non-tradables multiplied by the ratio of the supply of non-tradables over the supply tradables is equal to the negative of the own- price supply elasticity of tradables.

Precise estimates of demand (or supply) elasticities of tradables and non-tradables are not readily available in the literature. But the sum of the own-price elasticities of demand for tradables and non-tradables must be equal to the elasticity of substitution (defined negatively) between tradables and non-tradables. For the purpose of this study, we consider it reasonable to assume an elasticity of substitution of -1.0 between the use of tradables and non-tradables in the economy. In this world of two composite goods, the own-price elasticities of demand will be inversely proportional to their shares in total demand. Hence, if the share of tradables is 2/3 and the share of non-tradables is 1/3 of the total demand and the elasticity of substitution is equal to -1.0, then when trade is balanced, the own-price elasticities of demand for tradables and non-tradables must equal -0.33 and -0.67, respectively.

However, the size of the trade deficit in a country will expand the country's expenditures on tradable goods, thereby requiring an adjustment to the relative size of the two own-price elasticities of demand. This is the case for Uganda. We have calculated the trade balance over the period from 2008 to 2015 and found an average of trade deficit of 11.64% of GDP, ranging from 9.57% to 14.15%.[46] The own-price demand elasticity of tradable is adjusted from -0.33 to -0.296 while the own-price elasticity of demand for non-tradable becomes -0.704. On the supply side, the price elasticities of supply of exportables and importables are assumed to be +1.0, while the own-price supply elasticity of tradables $\left(\varepsilon_t^s\right)$ will also be +1.0.

In order to quantify the effects on the amount of import duties and export taxes, we must estimate the compensated own-price elasticity of demand for imports $\left(\eta_M^d\right)$ and the supply elasticity of exports $\left(\varepsilon_x^s\right)$. These elasticities are calculated using the assumed unity supply elasticity and -0.67 demand elasticity for importables and exportables.

3.2.4. The Effective Tax and Subsidy Rates

The major distortions involved in the estimation of the FEP and the NTP for Uganda include import duty, export tax, VAT, excise duty, and subsidy provided by government to producers.[47] Instead of statutory tax rates, the ratios of actual taxes collected or the amount of subsidies provided represent the effective rates of these distortions in the economy and are used to measure their impacts on welfare cost.

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[46] The size of trade deficits is substantial, ranging from 3,900 billions of shillings in 2008 to 8,487 billions of shillings in 2015. The main imported goods are refined petroleum, medical supplies, palm oil, vehicles, machinery and equipment. Expressed as percentage of GDP, imports accounted for 29.3% in 2008 to 29.1% in 2015. For exports, the major products are coffee, tobacco, cement, tea and corn. The total exports accounted for 16.76% to 18.71% in the past eight years.

[47] Uganda Revenue Authority (2011); PKF International Tax Committee, *Uganda Tax Guide 2013.pdf*.

Import Duty

The effective import duty rate is calculated by dividing the total import duty collections by the amount of imports at cost, insurance and freight (CIF) value. The amount of import duty includes import tariffs and any other surcharges associated with imported commodities or use of foreign exchange related to imports of those commodities.

Over the past 20 years, Uganda has developed to become one of the most open and integrated into the world economy. The establishment of the East African Community (EAC) was signed among Uganda, Kenya, and Tanzania on November 30, 1999 and the treaty entered into force on July 7, 2000 following its ratification. On June 18, 2007. Rwanda and Burundi acceded to the EAC Treaty to become full Members of the Community, effective July 1, 2007. Import tariff rates are lower between partner states to promote international trade compared to imports from non-partners.[48]

EAC partners operate as a single customs territory and trading bloc. A common set of import tariff rates applied on goods from non-partners under Common External Tariff (CET). CET essentially stipulates three tax bands if goods originate outside EAC: the import tariff rates are set at 0% for raw materials, 10% for intermediate goods or semi-processed goods, and 25% for finished goods.

The Common Market for Eastern and Southern Africa (COMESA) was also formed and then ratified on December 8, 1999 to overcome trade barriers faced by individual states. It replaced the former Preferential Trade Area that had been in place since 1981. It was launched to have focused on the economic and trade among member states since 2009 as the largest regional economic organization in Africa. Uganda is one of the 19 member states in the COMESA to promote freer trade among member states by reducing import tariffs for member nations.

The Automated System for Customs Data (ASYCUDA) information system is used for processing transactions of all goods imported in and exported out of the country. It contains details of import values and associated import tariffs and other taxes for each commodity. The main imported goods in Uganda include petroleum products, vehicles, machinery and equipment, pharmaceutical products, plastics, iron and steel, animal and vegetable fats, cereals, cement, and miscellaneous chemical products. The major import countries are Kenya, United Arabic Emirates, China, and India.

We received detailed tax data by category from Ministry of Finance, Planning and Economic Development. Four items under the category "taxes on international trade" are considered as part of import duties as shown in Table 2. In addition to import tariff, the most significant item is the levy on imported petroleum, which has been collected even more than import tariffs itself for years. Although it is not officially named as part

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[48] The Eastern African Community (2015); PWC (August 2017).

of import tariff, it is no different from import tariff levied on general goods for all intents and purposes.[49]

Second, imported goods other than petroleum and petroleum products, plant and machinery, and raw materials purchased by manufacturers are also subject to additional withholding tax at 6% of the CIF value at customs.[50] This is not different from import tariff.

Third, a surcharge imposed on used imports is also part of import duty. Lastly, there was a very small levy recorded on commission of imports in 20010/11, but nothing for other years.

The average effective import duty rate for Uganda is 9.35% over the past eight years, ranged from the lowest rate of 8.16% in 2011/12 to the highest rate of 10.77% in 2015/16, as shown in Table 2. For the purpose of this study, 9.35% is used for t_m in the model simulation.

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[49] If it is treated as excise duty, the results remain unchanged, as the levy on imported petroleum is not on top of import duty paid value. In other words, t_m for imported petroleum on the second item of equation (8) is zero.
[50] Uganda Revenue Authority (2011).

Table 2: Effective Import Duty Rates

Fiscal Year	Imports (Billions of Shillings)	Import Duties and other Levies (Billions of Shillings)					Effective Import Duty Rate
		Import Tariffs	Levy on Petroleum	Withholding Taxes	Surcharges On Used Imports	Total	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
2008/09	10,336.0	360.0	566.0	65.0	0	991.0	9.59%
2009/10	11,709.0	352.0	638.0	69.0	0	1,059.0	9.04%
2010/11	15,900.0	447.4	821.2	84.8	47.8	1,401.2	8.81%
2011/12	19,592.0	506.1	920.9	120.5	50.3	1,597.8	8.16%
2012/13	19,504.0	598.7	794.8	154.0	61.2	1,608.7	8.25%
2013/14	19,499.0	747.5	984.2	131.3	72.9	1,935.9	9.93%
2014/15	22,392.0	839.8	1,197.7	152.8	95.9	2,286.2	10.21%
2015/16	24,359.0	940.1	1,383.0	165.1	136.3	2,624.5	10.77%
2016/17	n/a	1,043.7	1,609.6	155.0	164.6	2,972.9	n/a

Sources: Uganda Bureau of Statistics for import data; Ministry of Finance, Planning and Economic Development for tax revenues, (November 7, 2017).

Export Tax

The main exported goods in Uganda include coffee, tea, spices, cereals, fishes, iron and steel, salt, edible vegetables, tobacco products, cocoa, seeds, and sugar. There is an export tax, which is currently imposed only on few goods such as birds and skins.[51] The effective export tax rate is calculated as the ratio of the amount of export tax to the total amount of exports at free on board (FOB) value. The amount was small as shown in Table 3; the effective export tax rate was estimated at 0.10% for the past two years. For the purpose of this study, 0.10% is used for t_x in the model.

Table 3: Effective Export Tax Rates

Fiscal Year	Exports (Billions of Shillings)	Export Taxes (Millions of Shillings)	Effective Export Tax Rate
2008/09	6,055.0	1,000.0	0.02%
2009/10	7,016.0	0	0.00%
2010/11	8,915.0	7,929.4	0.09%
2011/12	11,959.0	585.9	0.01%
2012/13	12,938.0	1.0	0.00%
2013/14	12,588.0	3,126.3	0.02%
2014/15	13,787.0	13,185.7	0.10%
2015/16	15,496.0	15,877.6	0.10%
2016/17	n/a	13,968.3	n/a

Sources: Uganda Bureau of Statistics for export data; Ministry of Finance, Planning and Economic Development for tax revenues, (November 7, 2017).

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[51] Government of Uganda, *the hides and skins (Export Duty) Act 1962*, Chapter 339.

Value Added Tax

VAT in Uganda is a consumption-type tax charged at a rate of 18% on all taxable supplies and services. It was introduced in July 1996 to replace Sales Tax and Commercial Transaction Levy.[52] Like most VAT jurisdictions, a number of products in Uganda are exempt from the tax, including unprocessed food stuff, unprocessed agricultural products and livestock, postage stamps, financial and insurance services, educational services, medical, dental and nursing services, dental, medical and veterinary equipment, social welfare services, betting, lotteries and games of chance, passenger transportation services, petroleum fuels (but subject to one kind of import duties), milk, supply of animal seeds. The current annual threshold for VAT registration is 150 millions of shillings,[53] which implies that the transaction of a firm under the threshold are outside the tax system and classified as exempt supplies.

Zero-rated supplies include international transport of goods or passengers, drugs and medicines, educational materials, seeds, fertilizers, and pesticides, and supply of cereals where cereal are grown, milled or produced in Uganda as well as all exported goods and services.

The service sector in Uganda has recently become the biggest sector in the economy like most developing countries. A wide range of services is exempted from the VAT as such a great proportion of non-tradable good sector becomes outside the VAT system. As a result, taxes paid on inputs used to produce those exempted goods and services are not creditable; such input taxes are expected to be shifted forward to final consumers in higher prices. This tax is reflected in the effective tax rate of non-tradable goods and services.

The effective tax rate for VAT is calculated as the ratio of VATs collected to total household final consumption expenditures. It is expected to be lower than the standard statutory rate due to exempted and zero-rated goods and services. Most tradable goods are levied at the standard rate with the exception of mainly unprocessed food. For non-tradable good sector, a great proportion of services including imputed services provided by own-occupied houses are exempt.

In the absence of detailed household expenditures by commodity, the proportions of tradable goods and non-tradable goods that are subject to the VAT are assumed at 85% and 20%, respectively.[54] Together with the estimated sizes of tradable and non-tradable goods and services at 2/3 and 1/3 of the economy, the weighted average of the effective VAT rate for Uganda as a whole is expected to be 11.44% (= (0.67*0.85 + 0.33*0.20)*18%), which is almost two-third of the statutory rate.

This figure is far greater than the total effective VAT rate over the past eight years as shown in Table 4 due to a huge informal economy as well as a substantial amount of

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[52] Government of Uganda (July 1, 1996).

[53] The annual threshold for VAT registration was changed several times. The current threshold of 150 millions of shillings was announced in the 2015/16 budget. It was 50 million shillings prior to the announcement of the budget.

[54] See, e.g., Kuo, Salci and Jenkins (2015) for other African countries.

tax avoidance and evasion. According to Uganda Bureau of Statistics, the informal economy accounts for 37.76% of all economic activities in 2016/17; the agriculture, forestry and fishing sector is the highest at 53.75%, industry at 30.63% and services at 29.06%.[55] With such huge informal economy plus tax avoidance and evasion, one would expect to have a significant amount of non-compliance of taxes.

The average effective VAT rate was estimated at 4.79% over the past eight years. For the past four years, the average rate was 5.21%, which is higher because of the recent enhanced tax administration and other factors. Using the 5.21% will be more realistic for our purpose. This suggests that the compliance ratio of the VAT system in Uganda would be around 45.54%. With this estimated compliance rate, we can estimate the effective VAT rate for tradable goods (v_t) at 6.97% and for non-tradable goods and services (v_{nt}) at 1.64%.[56]

Table 4: Effective VAT Rates

Fiscal Year	Household Consumption Expenditures (Billions of Shillings)	VAT Collections (Billions of Shillings)				Effective VAT Rate
		Amount Collected at Customs	Amount Collected Domestically		Total Amount of Tax Collected	
			Gross	Refund		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
2008/09	26,593.0	764.0	526.0	102.0	1,188.0	4.47%
2009/10	30,533.0	763.0	671.0	105.2	1,328.8	4.35%
2010/11	34,889.0	986.5	724.2	143.6	1,567.1	4.49%
2011/12	45,832.0	1,164.6	923.2	168.5	1,919.3	4.19%
2012/13	47,058.0	1,254.5	1,279.2	180.7	2,353.0	5.00%
2013/14	51,466.0	1,404.4	1,353.9	188.2	2,570.1	4.99%
2014/15	59,162.0	1,783.5	1,510.2	176.6	3,117.1	5.27%
2015/16	63,056.0	1,952.8	1,772.1	203.0	3,521.9	5.59%
2016/17	n/a	2,057.1	2,022.4	175.3	3,904.2	n/a

Sources: Uganda Bureau of Statistics for the household consumption expenditures data; Ministry of Finance, Planning and Economic Development for tax revenues, (November 7, 2017).

In addition, we are dealing with two operations in the general equilibrium analysis setting: funds extracted from the capital market, and the substitution effects on the quantities demanded and supplied in response to the real exchange rate. The incidence of a consumption-type VAT will be borne through the consumption portion of the demand for goods, because taxes paid on intermediate inputs and capital goods purchased by businesses are all refundable. For Uganda, we assume that the proportion of the change in demand that is excluded from VAT as a consequence of the substitution effect is 60% for ρ_s, based on the estimate made for South Africa. In the case of the

capital extraction, the coefficient is much higher at approximately 85% for ρ_i.[57]

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[55] These were estimated from Tables 8.1 and 9.1 in AGDP Publication Tables FY 2016/17 – Uganda Publication Tables.xls.

[56] 5.21% = [18%*0.85*0.67 + 18%*0.2*0.33]*45.54%
    = 6.97%*0.67 + 1.64%*0.33

[57] The 60% and 85% were based on estimates in which the sum of intermediate inputs plus capital

investment to the total output in South Africa for 1998. See Statistics South Africa (1998).

Excise Duty

Like most countries, Uganda imposes excise duty on selective commodities produced locally at a single stage with ad valorem rates or specific unit rates on cigarettes, alcoholic beverages, soft drinks, drinking water, sugar, phone talk time, cement, cane or beet sugar for industrial use and plastics. These selective commodities are all tradable and mainly purchased for final consumption with the exception of last three items. The excise duty is also levied on specified imported goods.[58] Even if they are purchased for business purposes, they are not creditable like the VAT system; the tax would be shifted forward to final consumption.

The excise duty is generally levied on either the duty-paid value of imports or at the factory gate price, if produced locally. With the general hypothesis of fully shifted forward sales tax, the effective excise duty rates are estimated based on the final consumption expenditures of households. They are shown in Table 5. The average rate for the past four years (t_e) was about 1.48%, which is used for measuring the FEP and NTP.

Table 5: Effective Excise Duty Rates

Fiscal Year	Household Consumption Expenditures (Billions of Shillings)	Excise Duties on Goods and Services (Billions of Shillings)				Effective Duty Rate
		Domestically Produced	Imported Goods	Temporary Road Licenses	Total	
2008-09	26,593.0	243.0	113.0	24.0	380.0	1.43%
2009-10	30,533.0	274.0	113.0	25.0	412.0	1.35%
2010-11	34,889.0	315.6	93.3	45.1	454.0	1.30%
2011-12	45,832.0	372.8	131.8	42.5	547.1	1.19%
2012-13	47,058.0	451.8	158.4	48.8	659.0	1.40%
2013-14	51,466.0	546.3	154.0	50.5	750.8	1.46%
2014-15	59,162.0	638.5	196.1	57.6	892.2	1.51%
2015-16	63,056.0	671.1	245.7	58.3	975.1	1.55%
2016/17	n/a	819.8	239.4	62.2	1,121.4	n/a

Sources: Uganda Bureau of Statistics for the household consumption expenditures data; Ministry of Finance, Planning and Economic Development for tax revenues, (November 7, 2017).

Production Subsidy

Subsidies provided to enterprises, resident producers or importers enable producers to compete in domestic and international markets. Uganda appears to have provided some subsidy, but the data are embodied in the category of subsidies and other transfers, according to the World Bank Indicators. Even if the share of subsidies can be discovered, the effective subsidy rates as a percentage of GDP at factor cost should be estimated separately between tradable and non-tradable good sectors; otherwise the net distortions for measuring the FEP and the NTP would be offset each other. For the purpose of this study, subsidy is not accounted for in the estimation.

3.2.5. Measuring the FEP and the NTP

All key parameters and effective tax and subsidy rates used to measure the FEP and the

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[58] Recall, imported petroleum is subject to petroleum duty, which has been dealt with as part of import duty.

NTP for Uganda were described in the previous sections and summarized in Table 6.

Table 6: Key Parameters and Effective Tax and Subsidy Rates

Categories	Parameters
Funds Sourced domestically: $\partial F^D/\partial F$	80.00%
Demand Shares of Importables in Total Tradables:	
Capital Extraction: $\partial Q_{d,i}/\partial Q_{d,t}$	87.00%
Substitution Effects: $\partial Q_{d,i}/\partial Q_{d,t}$	80.00%
$\partial Q_{d,e}/\partial Q_{d,t}$	35.00%
Own-price Demand and Supply Elasticities:	
Demand for Importables: $\eta_{d,i}$	-0.670
Demand for Exportables: $\eta_{d,e}$	-0.670
Supply of Importables: $\varepsilon_{s,i}$	+1.000
Supply of Exportables: $\varepsilon_{s,i}$	+1.000
Demand elasticity of tradable: $\eta_{d,t}$	-0.296
Demand Exclusion from VAT:	
ρ_i	85.00%
ρ_s	60.00%
Effective Tax and Subsidy Rates:	
t_m	9.35%
t_x	0.10%
v_t	6.97%
v_{nt}	1.64%
t_e	1.48%
k_t	0%

Substitute these parameters and effective tax and subsidy rates into the equations (6) – (9) and (11) – (14) will generate each of the welfare costs associated with various components of the FEP and the NTP. The results for this base case are summarized in Table 7. When funds are sourced domestically, the welfare cost is 9.23 percent for tradable goods and 2.97 percent for non-tradable goods. If funds are sourced abroad and spent on non-tradable goods, there is a welfare benefit at 6.26 percent instead of cost since it generates additional indirect taxes in the economy. For funds sourced abroad and spent on tradable goods, there is no impact on the economy as pointed out earlier.

Uganda is an open economy and integrated in the world capital markets. When a project raises funds in capital markets to finance its expenditures on investment, part of the funds will be sourced domestically and the remainder from foreign savers. They are estimated at approximately 80 percent from the local market and 20 percent from abroad as presented in Section II. Thus, the FEP and the NTP for the base case are estimated to be 7.39 percent and 1.13 percent, respectively.

Table 7: Summary of Externalities for the Base Case (Percentage)

Funds from	Domestic Capital Source	Foreign Capital Source	Premiums
Funds Spent on Tradables	9.23	0	7.39
Funds Spent on Non-tradables	2.97	-6.26	1.13

3.2.6. Sensitivity Analysis for the FEP and the NTP

The above empirical results depend on the proportion of funds sourced from the domestic and foreign markets, the shares of tradable and non-tradable goods, the

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demand and supply elasticities of tradable goods, and others. A sensitivity analysis is performed to determine the impact of these key parameters on the estimates of the FEP and the NTP.

Alternative Sources of Funds

The proportions of funds sourced domestically and abroad are highly influenced by the supply elasticity of foreign capital inflows with respect to the market interest rates. If the supply elasticity of foreign capital is 3.0 rather than 2.0 assumed for the base case, the share of financing from foreign funds becomes larger to 27.30% from 20.03% as pointed out in Section II. The remaining 72.7% will be sourced domestically. Using 73% for $\partial F^D/\partial F$, the FEP and the NTP would be 6.74 percent and 0.48 percent, respectively.

On the other hand, if the supply elasticity of foreign capital is 1.5 instead of 2.0, the share of financing from foreign savings will be reduced to 15.81% and from domestic sources, it will increase to 84.19%. Using 84% for $\partial F^D/\partial F$, the FEP and the NTP would be 7.75 percent and 1.50 percent, respectively.

The Shares of Tradable and Non-Tradable Goods

In the base case, we have assumed that the demand for importables accounts for 80% of the total tradable demand in the economy while the supply of importables is 35% of the total supply of tradables. If the supply of importables in total supply of tradables increases from 35% to 40%, the compensated own-price elasticity of supply of exports will increase from 1.74 to 1.84 while the own-price demand elasticity for imports will decrease from -1.97 to -2.34.

With these changes, we have simulated the model. The results indicate that the FEP and the NTP would be 7.47 percent and 0.88 percent, respectively.

Demand and Supply Elasticities of Tradable Goods

If the demand elasticities for importable and exportable goods are larger than that assumed for the base case, that is -1.00 instead of -0.67. Other things being equal, the compensated own-price elasticity of demand for imports will become -2.56 greater than -1.97 in the absolute value and so will the own-price supply elasticity of exports at 1.89 rather than 1.74 for the base case. In this situation, the FEP would be 7.52 percent; for the NTP, the premium would be 0.76 percent.

The results of the sensitivity analysis are summarized in Table 8. The value of the FEP ranges from 6.74 percent to 7.75 percent of the market value on tradable goods. For the NTP, it ranges from 0.48 percent to 1.50 percent of the market value on non-tradable goods. Although more cases could be simulated,[59] we believe that a value of 7.25 percent for the FEP and 1.00 percent for the NTP would be the reasonable estimates for

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[59] We have also conducted other sensitivity analyses. For example, if the proportion of the change in demand that is excluded from VAT as a consequence of the substitution effect is 50% instead of 60% for ρ_s, the FEP and the NTP would be 7.42% and 1.04%, respectively. The results are slightly changed from the base case.

augmenting the financial values of tradable and non-tradable goods in the financial cash flow statement to the economic values in the economic resource statement while conducting the economic evaluation of investment projects in Uganda.

Table 8: Results of Sensitivity Analysis for the FEP and NTP for Uganda

Scenarios	Key Assumptions	FEP	NTP
Base Case	- Sources of Funds: Domestic – 80%, Foreign – 20%; - Demand and supply of importables in total tradables: 80% and 35%; - Demand elasticities for importables and exportables: $\eta_{d,i} = -0.67$; $\eta_{d,e} = -0.67$	7.39%	1.13%
Sensitivity Analysis:			
- Sources of Funds	- Domestic: 73%, Foreign: 27% - Domestic: 84%, Foreign: 16%	6.74% 7.75%	0.48% 1.50%
- Demand and supply of importables in total tradables	- Demand: 80%, Supply: 40%	7.47%	0.88%
- Demand elasticities for importables and exportables	- $\eta_{d,i} = -1.00$; $\eta_{d,e} = -1.00$	7.52%	0.76%

4. Concluding Remarks

This paper has described the analytical framework and the practical approach to the estimation of the economic opportunity cost of capital and the premiums on the foreign exchange and non-tradable outlays for Uganda. These national parameters are the key variables in estimating the net economic costs and benefits of investment projects.

The approach used to measure the economic cost of capital considers the economic cost of raising funds in the capital market, which results in a slight increase in market interest. In response, alternative funds in the economy are shifted from displaced domestic investment, postponed private consumption, and additional foreign capital inflows. The weighted average of forgone rates of return on these alternative funds is the reasonable estimate of the economic cost of capital or the social discount rate to determine the economic viability of the investment projects in question.

Given the data obtained for the analysis, a sensitivity analysis is also carried out for the key parameters used in the study to ensure the robustness of the estimates. The simulation results indicate that either a 10.5 percent or 11.0 percent could be used as the social discount rate for Uganda. Nevertheless, we recommend that a 11 percent rate is an appropriate and the conservative discount rate for investment decision-making.

The other national parameter is the foreign exchange premium and the premium for non-tradable outplays. They are important for converting all financial cash flows into the economic resource statement in a consistent manner. This is due to the fact that various indirect tax and subsidy distortions are contemporarily affecting the financial value of tradable and non-tradable goods. Given the resource constraints, the analysis is undertaken in a general equilibrium in which resources must be shifted between tradable and non-tradable sectors in response of the relative price between these two sectors. The tax and other distortions must be measured in order to capture their impacts on the economy. The empirical results suggest that the FEP and the NTP for Uganda are about 7.25 percent and 1.00 percent, respectively. These premiums must be incorporated in the economic evaluation of investment projects.

The estimation of national parameters for Uganda has been a challenge with respect to data availability. In spite of this challenge, the methodology employed in this report is sound and the empirical simulations with various sensitivity analyses present robust estimates for the social discount rate and the premiums on the foreign exchange and non-tradable outlays to be used for economic appraisals of both public and private investment projects in Uganda.

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Appendix A: Return to Domestic Investment

| Fiscal Year | GDP (UGX Billion) | Labor Income (UGX Billion) | Agriculture | | | VAT (UGX Billion) | Product Taxes other than VATs | | | Depre-ciation (UGX Billion) | Return to Domestic Invest-ment (UGX Billion) | GDP Deflator | Real Return to Domest-ic Investment (UGX Billion) | Capital Stock | | Real Value of Reprodu-cible Capital Stock (UGX Billion) | Rate of Return to Domestic Investment |
			Agri. Share in GDP (Coef.)	Crop Share in Agri. (Coef.)	Contrib. By Land (UGX Billion)		Excise Duty on Domestic Goods (UGX Billion)	Levy on Imported Goods Other than VATs (UGX Billion)	Total Levies Borne by Labor (UGX Billion)					Total Capital Stock On July 1 (UGX Billion)	Reprodu-cible Capital Stock On July 1 (UGX Billion)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
2008/09	35,049.0	11,566.2	0.2935	0.5876	2,014.9	1,188.0	243.0	1,128.0	452.4	4,773.4	15,054.1	90.40	16,652.8	190,937.0	147,021.5	162,634.4	0.1024
2009/10	40,956.0	13,515.5	0.2885	0.5876	2,314.3	1,328.8	274.0	1,198.0	485.8	5,364.4	17,947.3	100.00	17,947.3	214,574.1	165,222.1	165,222.1	0.1086
2010/11	47,561.0	15,695.1	0.2835	0.5876	2,641.0	1,567.1	315.6	1,547.5	614.8	5,812.9	21,230.1	106.20	19,990.7	232,515.8	179,037.2	168,584.9	0.1186
2011/12	60,109.0	19,836.0	0.2785	0.5876	3,278.9	1,919.3	372,8	1,772.6	708.0	7,213.1	27,153.8	129.20	21,016.8	288,524.5	222,163.9	171,953.5	0.1222
2012/13	64,758.0	21,370.1	0.2735	0.5831	3,442.5	2,353.0	451.8	1,816.0	748.4	7,714.2	29,129.8	134.40	21,674.0	308,566.5	237,596.2	176,782.9	0.1226
2013/14	70,458.0	23,251.1	0.2696	0.5928	3,753.5	2,570.1	546.3	2,143.6	887.7	8,223.9	31,771.7	139.00	22,857.3	328,957.4	253,297.2	182,228.2	0.1254
2014/15	77,845.0	25,688.9	0.2596	0.5905	3,977.7	3,117.1	638.5	2,554.7	1,053.8	8,892.6	35,115.0	146.10	24,034.9	355,703.2	273,891.5	187,468.5	0.1282
2015/16	84,448.0	27,867.8	0.2572	0.5840	4,228.2	3,521.9	671.1	2,886.1	1,173.9	9,438.0	38,218.2	151.20	25,276.6	377,521.0	290,691.2	192,256.1	0.1315
2016/17	90,514.0	29,869.6	0.2550	0.5876	4,520.8	3,904.2	819.8	3,357.5	1,378.5	10,114.1	40,726.7	157.70	25,825.5	404,564.6	311,514.8	197,536.3	0.1307

Sources and Notes:

Column (2) is obtained from Uganda Bureau of Statistics, copy of Revised GDP FY 2015-16.xls for years 2008/9 to 2015/16 and AGDP Tables FY 2016/17 for year 2016/17.

Column (3) = 0.33* (2).

Columns (4) and (5) are estimated from activities by sector; crop include cash crop (coffee) and food crop. Sources: AGDP Publication 2016/17-Uganda Publication.

Column (6) = [(2)*(4)*(5)]/3.

Column (7) is the sum of VAT collections from imported and domestic net of refunds; details are shown in the VAT section later. Sources: Ministry of Finance, Planning and Economic Development, (November 7, 2017).

Column (8) is obtained from excise duties levied on goods including cigarettes, alcoholic beverages, bottle water, soft drinks, sugar, and cosmetics. Sources: Product Taxes, Ministry of Finance, Planning and Economic Development, (November 7, 2017).

Column (9) is product taxes other than VATs.

Column (10) = [(8) + (9)]*0.33.

Column (11) is estimated at 2.5% of total capital stock at beginning of each fiscal year, shown in Column (15).

Column (12) = (2) – (3) – (6) – (7) – (10) – (11).

Column (13) is obtained from Uganda Bureau of Statistics.

Column (14) = (12)/[(13)/100)].

Column (15) is obtained from Appendix B for details.

Column (16) = 0.77*(15).

Column (17) = (16)/[(13)/100)].

Column (18) = (14)/(17).

Appendix B: Estimates of Total Capital Stocks

Time	Total Capital Stock (US$ Million)	Exchange Rate (Shillings/US$)	Total Capital Stock (UGX Billing)		
Jan. 1, 2008	96,493.59				
Jan. 1, 2009	112,952.09				
July 1, 2008	104,722.84	1,823.26	190,936.97		

Fiscal Year	Gross Fixed Capital Formation (UGX Billion)	GDP Deflator	Total Capital Stock on July 1 (UGX Billion)		
			Base Case (Dep. Rate: 2.5%	Scenario 1 (Dep. Rate: 2.0%)	Scenario 2 (Dep. Rate: 3.0%)
(1)	(2)	(3)	(4)	(5)	(6)
2008/09	8,641.00	90.40	190,936.97	190,936.97	190,936.97
2009/10	10,335.00	100.00	214,574.12	215,630.19	213,518.05
2010/11	12,724.00	106.20	232,515.77	234,754.27	230,288.49
2011/12	15,933.00	129.20	288,524.49	292,607.68	284,481.76
2012/13	17,808.00	134.40	308,566.51	314,229.77	302,986.55
2013/14	18,587.00	139.00	328,957.37	336,292.97	321,763.93
2014/15	18,604.00	146.10	355,703.23	364,988.11	346,640.37
2015/16	20,658.00	151.20	377,520.97	388,778.39	366,582.53
2016/17	n/a	157.70	404,564.62	418,039.91	391,529.45

Sources and notes:

Total capital stock in US dollars on January 1 of 2008 and 2009 are obtained from University of California, Davies, Penn World Table 9.0, Reference: Feenstra, Inklaar, and Timmer (2014);

Exchange rate is obtained from Bank of Uganda;

Column (2) is obtained from Uganda Bureau of Statistics, Revised GDP FY 2015-16.xls;

Column (3) is obtained rom Uganda Bureau of Statistics;

Column (4) is estimated as follows:

$$K_t = K_{t-1}*(1-2.5\%)*(1 + \Delta \text{ GDP deflator}) + \text{Gross Fixed Capital Formation}$$

For example, for year 2009, $214,574.12 = 190,936.97*(1 – 0.025)*(100.0/90.40) + 8,641.00$

Columns (5) and (6) are estimated in the same way as Column (4).

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Appendix C: Rate of Return to Domestic Savings

Fiscal Year	Return to Domestic Investment (UGX Billion)	Corporate Taxes and other Taxes on Capital Incomes (UGX Billion)	Capital Component of Financial Intermediation Services (UGX Billion)	Return to Domestic Savings (UGX Billion)	GDP Deflator	Real Return to Domestic Savings (UGX Billion)	Real Value of Reproducible Capital Stock (UGX Billion)	Rate of Return to Domestic Savings
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
2008/09	15,054.1	473.0	347.1	14,234.1	90.40	15,745.6	162,634.4	0.0968
2009/10	17,947.3	616.0	409.4	16,921.9	100.00	16,921.9	165,222.1	0.1024
2010/11	21,230.1	783.5	517.9	19,928.7	106.20	18,765.2	168,584.9	0.1113
2011/12	27,153.8	994.2	733.0	25,426.6	129.20	19,680.0	171,953.5	0.1144
2012/13	29,129.8	1,234.9	736.3	27,158.6	134.40	20,207.3	176,782.9	0.1143
2013/14	31,771.7	1,208.8	755.1	29,807.8	139.00	21,444.4	182,228.2	0.1177
2014/15	35,115.0	1,635.8	871.7	32,607.5	146.10	22,318.6	187,468.5	0.1191
2015/16	38,218.2	1,603.4	1,088.1	35,526.7	151.20	23,496.5	192,256.1	0.1222
2016/17	40,726.7	2,065.1	1,150.4	37,511.3	157.70	23,786.5	197,536.3	0.1204

Sources and Notes:

Column (2) is obtained from Column (12) of Appendix A.
Column (3) is the sum of corporate taxes, presumptive taxes, as well as rental income, tax on bank interest and other capital incomes, obtained from the Ministry of Finance, Planning and Economic Development, (November 7, 2017).
Column (4) is derived from the sum of financial services provided by commercial banks and credit institutions, obtained from the Ministry of Finance, Paul MoFPED.xlsx, (November 2017).
Column (5) = (2) – (3) – (4).
Column (6) is obtained from Uganda Bureau of Statistics.
Column (7) = (5)/[(6)/100].
Column (8) is obtained from Column (17) of Appendix A.
Column (9) is obtained from dividing (7) by (8).

Appendix D: External Long-Term Debt and Foreign Direct Investment in Uganda

(Millions of US Dollars)

Category	2010	2011	2012	2013	2014	2015
External Long-term Debt Stock	2,672.9	2,963.4	3,478.4	4,064.5	4,212.8	4,873.4
Of which: concessional loans	86.2%	87.9%	83.0%	83.0%	83.1%	N/A
Of which: non-concessional loans	13.8%	12.1%	17.0%	17.0%	16.9%	N/A
Foreign Direct Investment (FDI) Stock	5,575.0	6,469.0	7,674.0	8,770.0	9,829.5	10,368.0
Of which: debt financing at 33%	1,839.8	2,134.8	2,532.4	2,894.1	3,243.7	3,421.4
Total Long-term debt and FDI Stock	8,247.9	9,432.4	11,152.4	12,834.5	14,042.3	15,241.4
Of which: debt financing with market interest rates	2,208.7	2,493.4	3,123.7	3,585.7	3,955.7	N/A
Percentage of Total Stock of Long-Term Debt and FDI with Market-Determined Debt Financing	26.8%	26.4%	28.0%	27.9%	28.2%	N/A

Sources: World Bank, *World Bank Indicators* for percentages of concessional loans; UNCAT, *World Investment Report 2016*, United Nations Publications, ISBN 978-92-1-112902-1 for foreign direct investment stock.

Annex B: User Manual

Commodity-Specific Conversion Factors Database for the Republic of Uganda

USER

MANUAL

Table of Contents

List of Figures

Introduction

Uganda Commodity-Specific Conversion Factors Database (Uganda CSCF) has been developed by Cambridge Resources International Inc. (CRI) for the Ministry of Finance, Planning and Economic Development of the Republic of Uganda. The database contains Commodity-Specific Conversion Factors (CSCFs) for estimating economic values for 5,900 tradable commodities and 16 Non-tradable items such as Construction, Electricity, Telecommunication and Transportation services. The database is created to search for, present, and update, whenever necessary, the CSCFs for Uganda's tradable and non-tradable goods and services. It is designed for professionals involved in the economic and social appraisal of investment projects in Uganda.

The program provides multiple ways to search and browse the database with an easy to learn interface. CRI has estimated the CSCFs in this database on the basis of the prevailing distortions (taxes, custom duties, subsidies, etc.) in the Ugandan economy.

This user manual provides a helpful guide on how to use the system and all its components. The rest of the manual is organised as follows. The first section describes the user interface of the program. The second section provides a brief discussion of the use of CSCFs in project evaluation, their different types and the choice of the relevant ones when carrying out an economic appraisal of an investment project.

Uganda CSCF Interface

Home Page

User will be met with a homepage every time they visit the website and from here, they can use the top navigation pane to access all parts of the website.
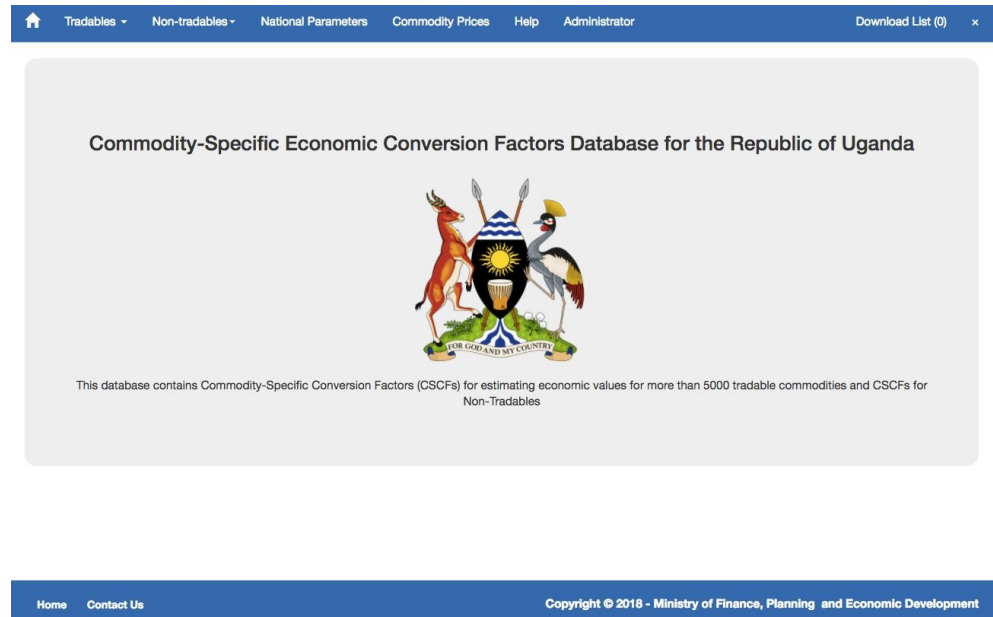
Figure 1: Landing Page

Search Tradables

The search tradables page is a comprehensive search engine that facilitates the search for 5,900 tradable commodities in the database.
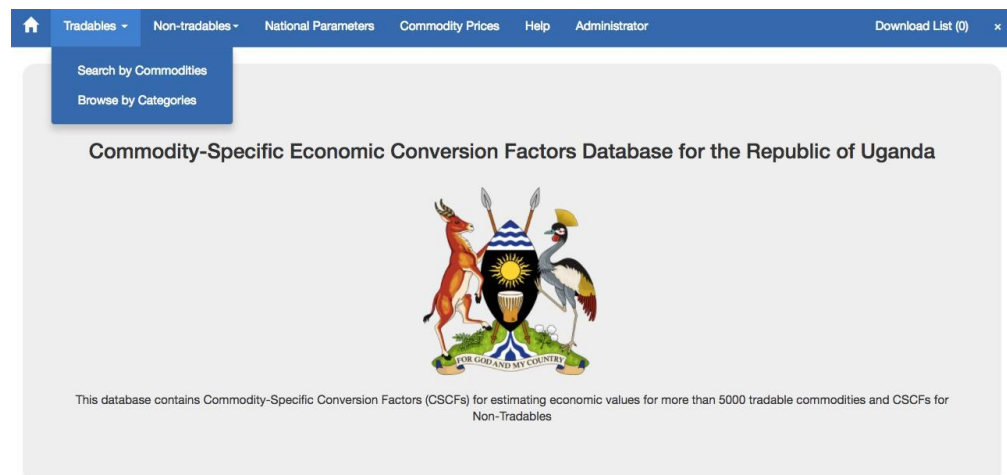
Figure 2: Search Tradables Page

In the search bar, a user can search according to **keyword**, **HS Code**[1] or **(Sub)Chapter Number**.

After typing the desired **keyword**, **HS Code** or **(Sub)Chapter Number**, user can press enter or click the search button to reveal the search results. The X symbol can be pressed at any time to reset the search.
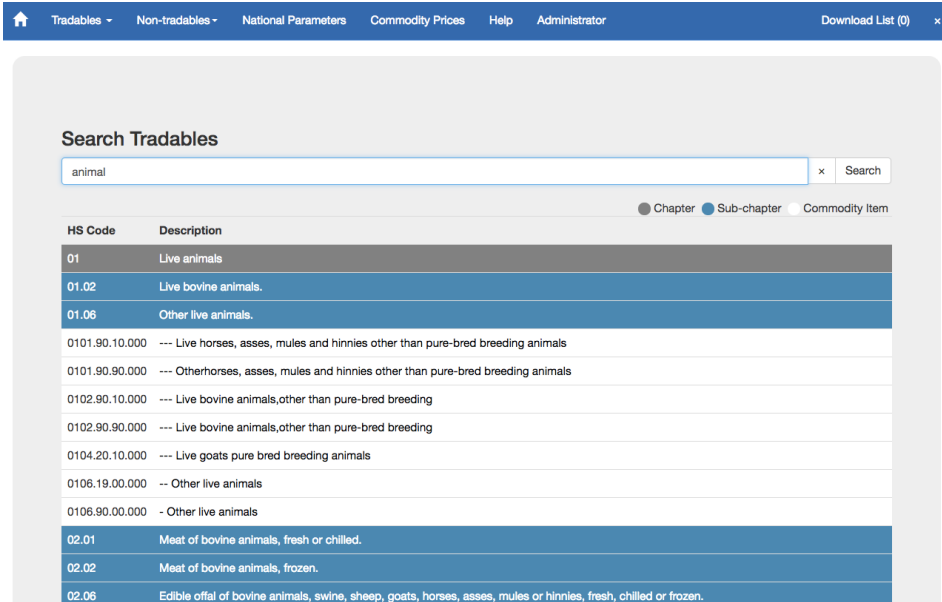
Figure 3: Sample Search Results for "Animal"

Search colour coordinates Chapters (Gray), Sub-chapters (Blue) and Commodities (White). The (sub)chapters and commodities are displayed in the database as they are categorised in the HS code.

If a chapter or a sub-chapter is selected, the user is directed to the chapter with all subchapters displayed in the browse tradable page.

If a commodity is selected, the user is directed to the calculation page where they can view or perform simulations on the CSCF of the selected commodity.

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[1] The Harmonized Commodity Description and Coding System, generally known as the Harmonized System (HS) is used by the World Customs Organization (WCO) as an internationally standardized system of names and numbers to classify traded products.

Browse Tradables
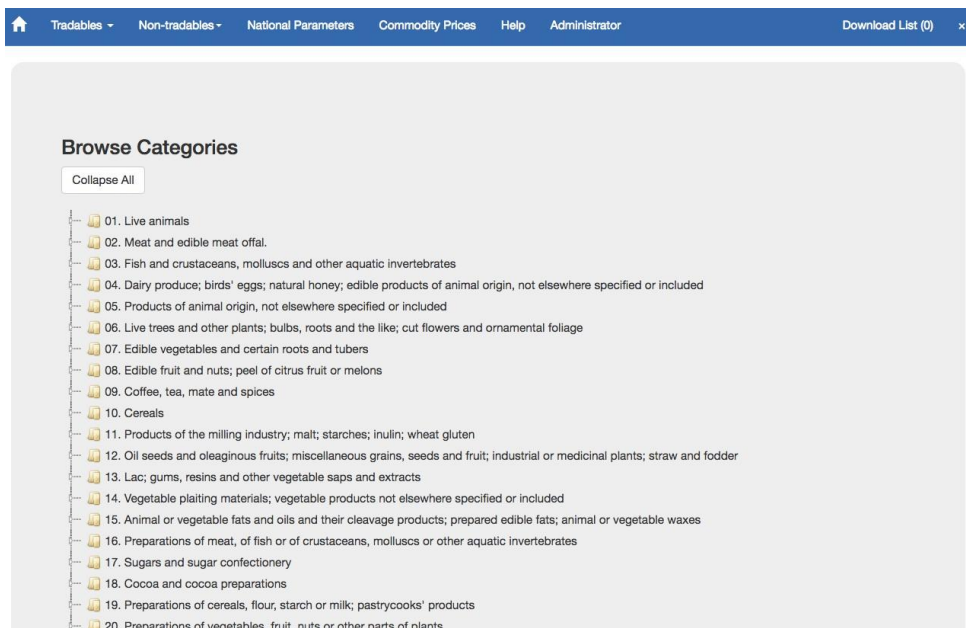
Figure 4: Browse Categories Page

Browse categories page provides an alternative way to search through tradable commodities, categorised into 99 HS chapters. When a user selects a chapter, the chapter will expand and reveal all sub-chapters associated with the chapter. Once the sub-chapter is also selected, it will expand to show all commodities within the sub-chapter.
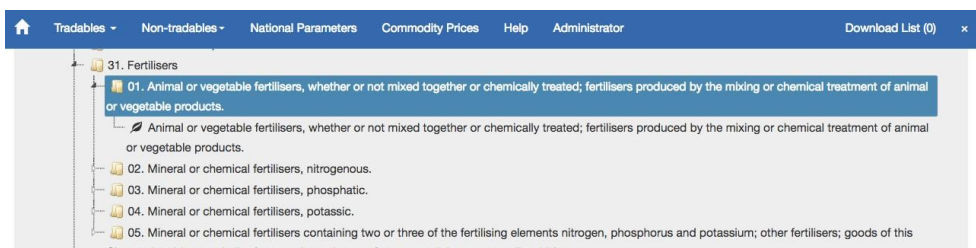
Figure 5: Sample Chapter, Sub-chapter Expansion

Once a commodity is selected, the user is directed to the calculation page to view, download and/or perform simulations on the CSCF of the particular commodity.

Collapse All button will collapse the tree into its original state.

Conversion Factors for Tradables

A user can access this page by either searching for a commodity and clicking it on the search tradable page, or alternatively, browsing by category and selecting a commodity via the browse categories page.
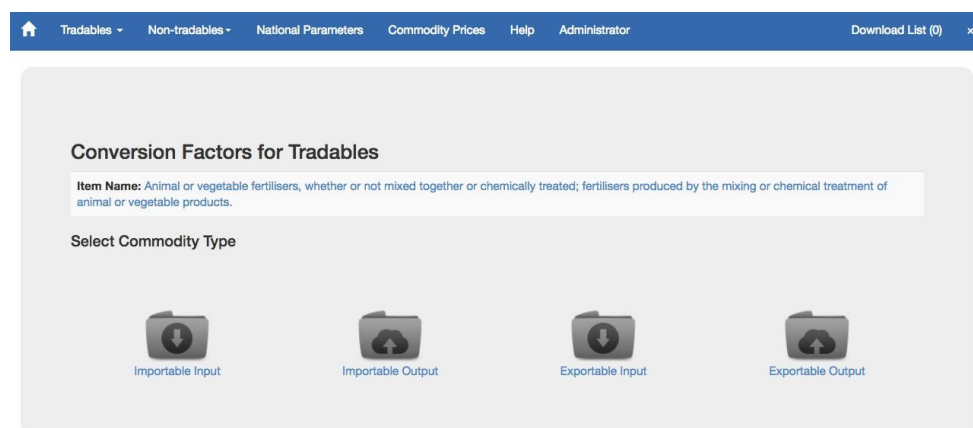
Figure 6: Conversion Factors for Tradables

Item Name refers to the commodity description, in the above example "Animal or vegetable fertilisers" commodity is selected.

Clicking on the item name will reveal detailed information about the commodity such as its HS Code, Chapter Name as well as its Sub-Chapter Name.
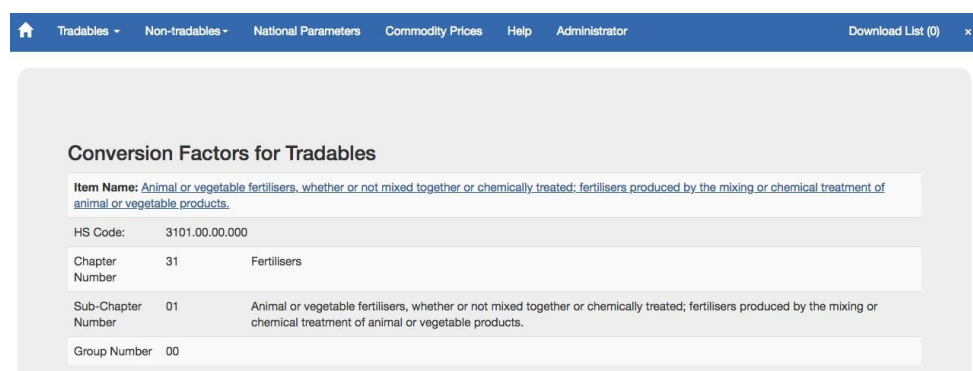
Figure 7: Expanded Item Details

Four different commodity types can be selected to reveal different estimations, which are "**Importable Input**", "**Importable Output**", "**Exportable Input**" and "**Exportable Output**".[2]

---

[2] See the second section of the manual for details of the commodity types.

Once a commodity type is selected, a tab will appear and present the user estimation results as well as options for the user to practice estimations by inputting values into the table.
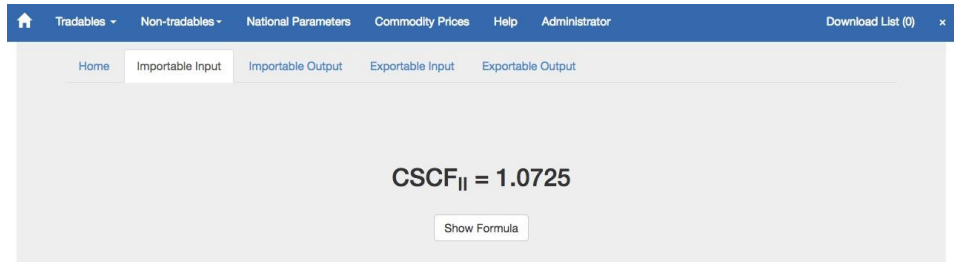
Figure 8: Importable Input Commodity Type Selected

Show Formula will reveal the estimation formula for the commodity type.
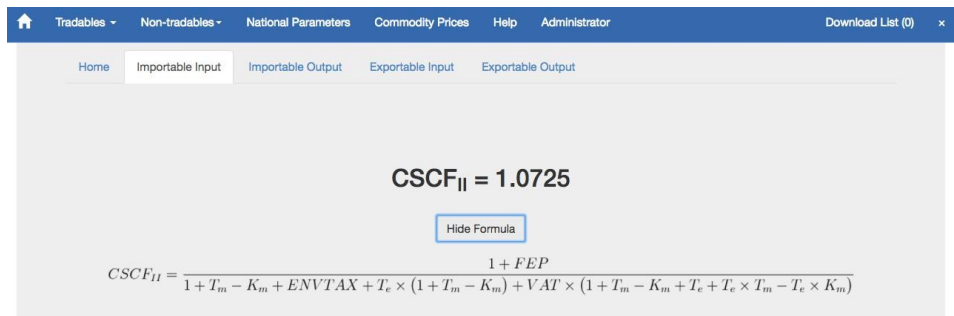
Figure 9: Show Formula Expanded
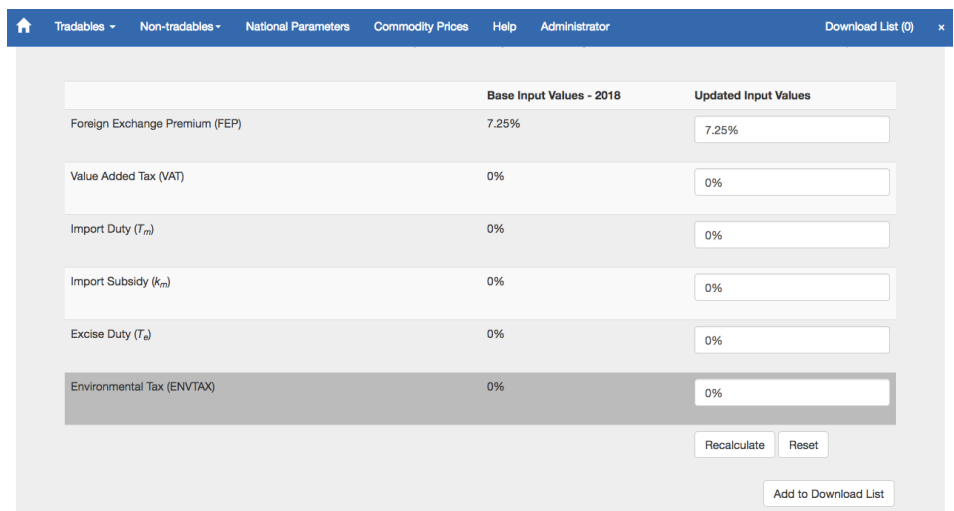
Figure 10: Simulation Table for Updating Input Values

Hide Formula hides the currently expanded formula.

The table allows a user to input different values and recalculate to display a new estimation result.

Base Input Values are calculated using the base input values as of the designated year.

Recalculate commits the Updated Input Values to the formulation and displays the estimation with the updated values.

Reset allows resetting of the inputted values for the estimation results.

Add to Download List allows users to save their estimation results to an excel file which can be downloaded by pressing the "Download List" from the top menu.

User can add various commodities (tradable and/or non-tradable) or different types of a particular tradable commodity to the download list by clicking "Add to Download List" each time CSCF is displayed for the commodity. Once the desired numbers of items are added to the list, the list can be downloaded by clicking the "Download List" on the top right of the navigation pane.
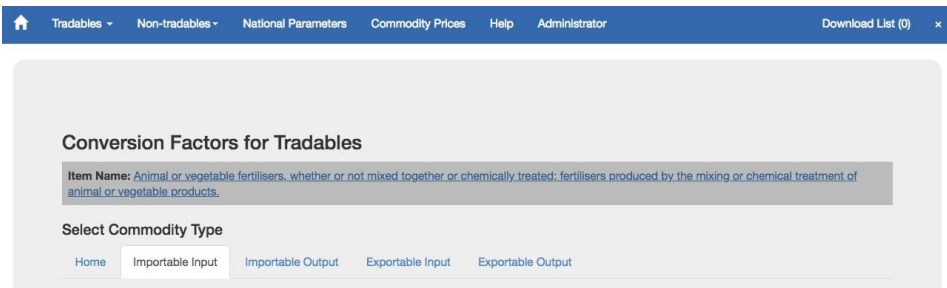
Figure 11: Download List on Top Right

By pressing the X button next to the "Download List", the accumulated list of commodities will be reset back to zero.

Non-tradables

A number of Non-tradable services such as, "Construction", "Electricity", "Telecommunication" and "Transportation", are calculated in this page.
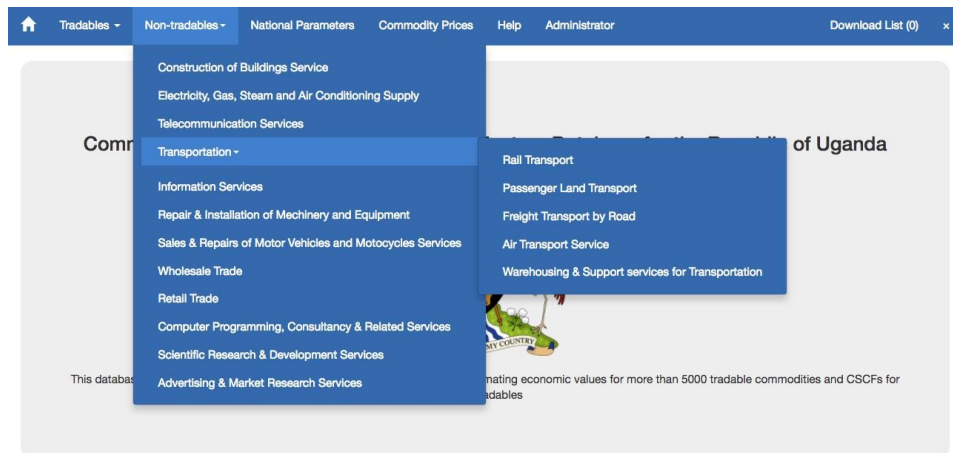
Figure 12: Non-tradables Landing Page

Once a user selects a service, they will be redirected to the conversion factors page where they can see the estimation results as well as options for the user to practice estimations by inputting values into the table.
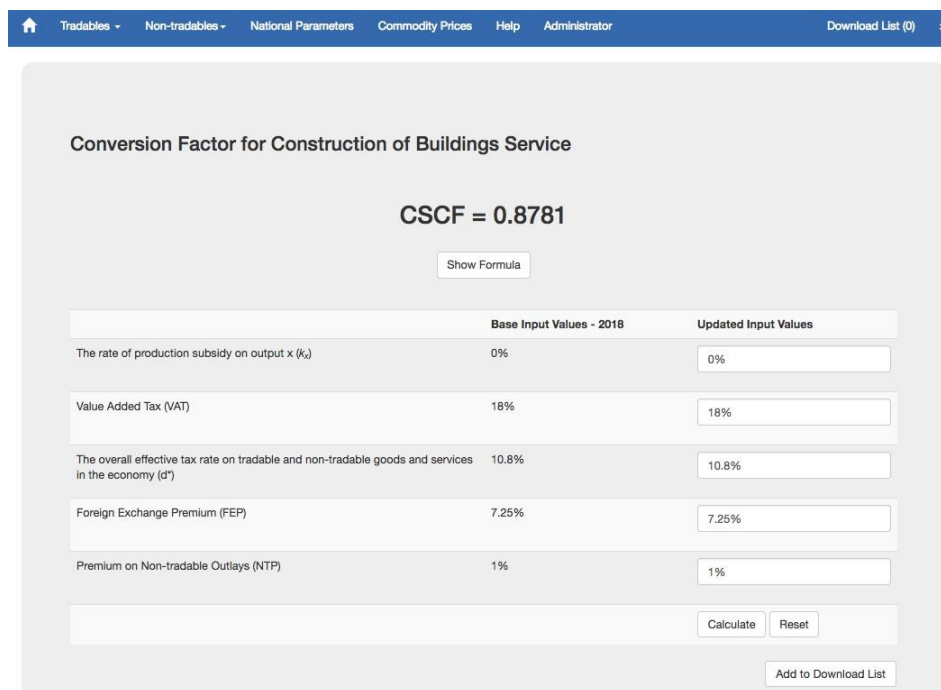
Figure 13: Non-tradables Estimation Page

CSCF = 0.8781

Hide Formula

$$P_x^e = W_x^s P_x^m (1 + k_x) + W_x^d P_x^m (1 + t_x^v - d^*)$$
$$- W_x^s \left[\sum_i a_{ix}^o P_i^m d_i + \sum_j a_{jx}^o \left\{ W_j^s P_j^m (t_j^e + g_j - k_j) + W_j^d P_j^m (d^* - t_j^v) \right\} \right]$$
$$+ [P_x^m \times T_x \times \text{FEP}] + [P_x^m \times NT_x \times \text{NTP}]$$

$$CSCF = \frac{P_x^e}{P_x^m \times (1 + t_x^v)}$$

Figure 14: Show Formula Button Expanded

Show Formula will reveal the estimation formula for the commodity type as well as the notations associated with the formula.

Notations:

x:	Non-tradable output produced or purchased by the project
P_x^e:	Economic price of output x
W_x^s:	Supply weight for output x
W_x^d:	Demand weight for output x ($W_x^d + W_x^s = 1$)
P_x^m:	Market price per unit of output x (net of value added tax, i.e. VAT)
k_x:	The rate of production subsidy on output x
t_x^v:	VAT on output x
d^*:	The overall effective tax rate on tradable and non-tradable goods and services in the economy
a_{ix}:	Input-output coefficient for tradable input i used in the production of a unit of output x
a_{jx}:	Input-output coefficient for non-tradable input j used in the production of a unit of output x
P_i^m:	Market price per unit of input i (net of VAT)
d_i:	The rate of non-creditable tax or subsidy on the tradable inputs used in the production input i
P_j^m:	Market price per unit of input j (net of VAT and distortions on tradable components of input j)
t_j^e:	The rate of non-creditable taxes, e.g., excise taxes, on input j
g_j:	The rate of non-creditable taxes, e.g. import duties and excise taxes, on the inputs of j
k_j:	The rate of production subsidy on input j
t_j^v:	VAT on input j paid by the new consumers of j
T_x:	Share of tradable components for output x
NT_x:	Share of non-tradable components of output x ($T_x + NT_x = 1$)
FEP:	Foreign exchange premium
NTP:	Premium on non-tradable outlays

Figure 15: Notations Under the "Show Formula" Button

Hide Formula hides the currently expanded formula.

The table allows a user to input different variables and recalculate to display a new estimation result.

Base Input Values are calculated using the base input values as of the designated year.
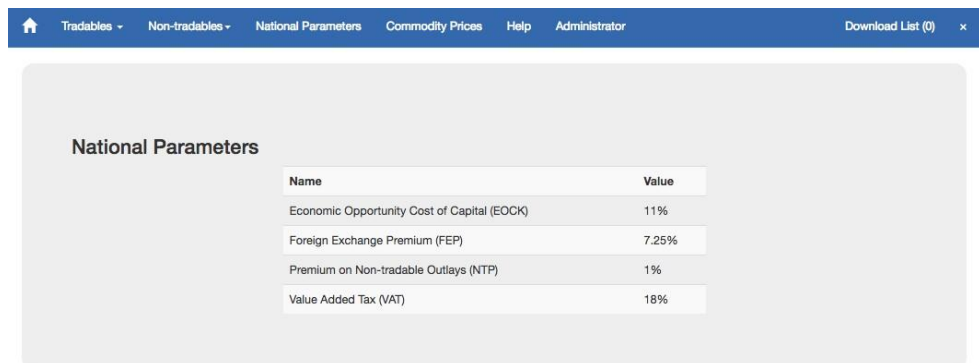
Recalculate commits the Updated Input Values to the formulation and displays the estimation with the updated values.

Reset allows resetting of the inputted values for the estimation results.

Add to Download List allows users to save their estimation results to an excel file which can be downloaded by pressing the "Download List" from the top menu.

National Parameters

National Parameters are displayed in this page. Only the Administrator of the database can permanently update the National Parameters. As described earlier, users can temporarily update the parameters in calculation pages for simulation purposes.

National Parameters	
Name	Value
Economic Opportunity Cost of Capital (EOCK)	11%
Foreign Exchange Premium (FEP)	7.25%
Premium on Non-tradable Outlays (NTP)	1%
Value Added Tax (VAT)	18%

Figure 16: National Parameters Page

Use of Conversion Factors in Project Appraisal

Why Use Conversion Factors

Economic prices account for the real resources consumed or produced by a project and hence do not include tariffs, taxes or subsidies as these are merely transfers between consumers, producers and the government all within the same economy. Financial prices are market prices, which naturally incorporate all the tariffs, taxes and subsidies.

In project appraisal, the difference between the financial and economic values of inputs and outputs should be emphasized particularly when distortions exist on either the demand or supply side of markets for these goods and services. These distortions, which are caused by trade taxes and subsidies as well as other indirect taxes (such as the value added tax- VAT), drive a wedge between financial and economic prices of goods and services. The concept of a conversion factor, defined as the ratio of the economic price to the financial price, can play an important role in determining the economic costs or benefits of a project and in measuring the divergence between the prices.

Since a CSCF is the ratio of the economic price of a commodity to its financial price, the economic price of any commodity can be determined by multiplying the CSCF of that commodity times its financial price. Uganda CSCF helps the user identify the CSCF that is then used to estimate the economic price of the commodity as part of the economic appraisal of the investment under analysis.

$$CSCF = \frac{Economic\ Price}{Financial\ Price}$$
$$\Downarrow$$
$$Economic\ Price = Financial\ Price\ x\ CSCF$$

Different Types of Conversion Factors

Buying or Producing the Commodity

The CSCF is the ratio of a commodity's economic price to its financial price. While the economic price of a commodity will be the same whether the project is producing this commodity as an output or using it as an input, the financial prices could differ from one case to another.[3]

For example, an excise tax (duty) levied on a certain good or the more general VAT will increase the financial price paid by consumers (demand price) but will not affect the cost to producers (supply price). If the project is using (buying) the commodity, the relevant financial price to the project will be the demand price and the CSCF will be given the notation $CSCF_{II}$ or $CSCF_{EI}$ depending on whether the demanded good is an importable (importable input, II) or exportable (exportable input, EI) commodity. Alternatively, if the project is producing (selling) the commodity, the relevant financial price would be the supply price and the commodity-specific conversion factor will be given the notation $CSCF_{IO}$ or $CSCF_{EO}$, i.e. importable output (IO), exportable output (EO). For non-tradables, however, as there is no difference between the CSCF for inputs and outputs, only the notation CSCF is used.[4]

Tradable vs. Non-Tradable

While the methodology used for the estimation of internationally tradable goods is the same as that of internationally non-tradable goods and services, the resulting formulas for the estimation of the conversion factors are different. We provide below definitions for tradable and non- tradable goods and services.

A good or service is considered **tradable** when an increase in demand (supply) by a project does not affect the amount demanded (supplied) by

---

[3] There is likely to be a difference between the economic value of a commodity demanded by a project (an input) and the economic value of the same commodity when produced by a project (an output) due to possible differences in transport and handling content of the input and the output. If the economic value is estimated at the port (before any domestic freight and handling are taken into account), both economic values will be the same.

[4] See Jenkins (2011a) for technical details.

domestic consumers (producers). The increase in demand (supply) by a project is eventually reflected as an increase (decrease) in imports or a decrease (increase) in exports depending on whether the project is demanding or supplying the importable or exportable commodity.

Uganda **importable** goods include (a) all goods imported into Uganda and (b) all goods produced and sold domestically that are close substitutes for either the imported goods or potentially imported goods. An increase in demand for an importable commodity by a project, results in an increase in demand for imports. Alternatively, when a project produces an importable commodity, there will be a reduction in imports.

Uganda **exportable** goods include (a) all goods exported by Uganda and (b) domestic consumption of similar or close substitutes for the exported goods. An increase in demand for an exportable commodity by a project, results in a reduction in exports, while the production of an exportable by a project will result in an increase in exports.

A commodity or service is "**non-tradable**" from Uganda's point of view if its domestic price lies above its free on board (FOB) export price or below its cost, insurance and freight (CIF) import price. The international transportation cost may be very high compared to the value of the product so that no profitable trade is feasible. Alternatively, an importable good will become non-tradable if it receives such a high level of protection in the form of trade quotas or prohibitive tariffs that no import transactions will take place.

Equations for Estimating Conversion Factors

Tradables

Importable Commodities

For importable commodities, and assuming the only direct distortions are due to import tariffs and other taxes such as excise and value added taxes, the CSCF measured at the port (i.e., before considering transportation and handling costs) for a project importing a commodity to use as an input (importable input, II) can be calculated as follows:

$$CSCF_{II} = \frac{1 + FEP}{1 + T_m\text{-}K_m + ENVTAX + T_e\times(1 + T_m\text{-}k_m) + VAT\times(1 + T_m\text{-}k_m + T_e + T_e\times T_m\text{-}T_e\times K_m)}$$

where,

- FEP is the foreign exchange premium estimated at 8.07% for Uganda;
- T_m stands for the rate of import duty levied on the CIF price of the imported input;
- k_m is the rate of import subsidy expressed as the percentage of the CIF price;
- T_e is the rate of excise duty levied on the CIF price plus the import duty on the imported input; and
- VAT is the value added tax rate levied on the basis of the sum of CIF price, import duty, and excise duty on the commodity.
- ENVTAX is the rate of environmental tax levied on used or second hand imported products.

The CSCF measured at the port (i.e., before considering transportation and handling costs) for a project producing an import substitute (importable output, IO) measured at the port can be calculated as follows:

$$CSCF_{IO} = \frac{1 + FEP}{1 + T_m\text{-}K_m + ENVTAX + T_e\times(1 + T_m\text{-}k_m) + VAT\times(1 + T_m\text{-}k_m + T_e + T_e\times T_m\text{-}T_e\times K_m)}$$

Exportable Commodities

For exportable goods, and assuming the only direct distortions levied on the commodity are due to an export subsidy or export tax and a value added tax, the CSCF measured at the port (i.e., before considering transportation and handling costs) for a project producing an exportable commodity (exportable output, EO) will be estimated as follows:

$$CSCF_{EO} = \frac{1 + FEP}{(1 + k_x - T_x)}$$

where, k_x stands for the rate of export subsidy, and T_x is the rate of

export tax, both expressed as the percentage of the FOB price.

The CSCF measured at the port (i.e., before considering transportation and handling costs) for a project using an exportable good as an input

(exportable input, EI, i.e., a good that would have otherwise been exported) can be calculated as follows:

$$CSCF_{EI} = \frac{\square 1 + FEP}{(1 + k_x - T_x) \times (1 + VAT)}$$

The only difference between the conversion factors for exportable inputs and exportable outputs is the value added tax. If a project is using an exportable input, the financial price to the project will include the value added tax. If, on the other hand, a project is producing a good for export, the supply price to this project will not include the VAT.

Non-tradables

The number of non-tradable commodities in any economy is typically much smaller than that of tradable commodities. Here in this case, CSCFs were estimated for sixteen non-tradable services, i.e. construction, electricity, telecommunication, and transportation.

The general formula for the estimation of the economic prices of non-tradable goods and services has the following form:

$$P_x^e = W_x^s P_x^m (1 + k_x) + W_x^d P_x^m (1 + t^v - d^*)$$
$$- W_x^s{}^\Upsilon \sum_{\leq i} a_{ix}^o P_i^m d_i + \sum_j a_{jx}^o \left\{ W_j^s P_j^m \left(t_j^e + g_j - k_j \right) + W_j^d P_j^m \left(d_j^* - t_j^v \right) \right\}^{/}_{f}$$

$$+ \Upsilon_{\leq x} P_x^m \times T_x \times FEP^/_f + \Upsilon_{\leq x} P_x^m \times NT_x \times NTP^/_f$$

where,

- x : Non-tradable output produced or purchased by the project
- P_x^e : Economic price of output x
- W_x^s : Supply weight for output x
- W_x^d : Demand weight for output x ($W_x^d + W_x^s = 1$)
- P_x^m : Market price per unit of output x (net of value added tax, i.e. VAT)

- k_x : The rate of production subsidy on output x
- t_x^v : VAT on output x

- k_x : The rate of production subsidy on output x
- t_x^v : VAT on output x

- d^* : The overall effective tax rate on tradable and non-tradable goods and services in the economy
- a_{ix} : Input-output coefficient for tradable input i used in the production of a unit of output x
- a_{jx} : Input-output coefficient for non-tradable input j used in the production of a unit of output x
- P_i^m : Market price per unit of input i (net of VAT)
- d_i : The rate of non-creditable tax or subsidy on the tradable inputs used in the production input i
- P_j^m : Market price per unit of input j (net of VAT and distortions on tradable components of input j)
- t_i^e : The rate of non-creditable taxes, e.g., excise taxes, on input j
- g_j : The rate of non-creditable taxes, e.g. import duties and excise taxes, on the inputs of j
- k_j : The rate of production subsidy on input j
- t_j^v : VAT on input j paid by the new consumers of j
- T_x : Share of tradable components for output x
- NT_x : Share of non-tradable components of output x $(T_x + NT_x = 1)$
- FEP : Foreign exchange premium
- NTP : Premium on non-tradable outlays

In line with the case of tradables, CSCF for non-tradables can be calculated as follows:

$$CSCF = \frac{\text{Financial Price}}{\text{Economic Price}} \quad \frac{P_x^e}{P_x^m \times (1 + t_x)}$$

$$\Downarrow$$

Economic Price = Financial Price x CSCF

Acknowledgement

Developing Team

References

Jenkins, G. P., Kuo C. Y. and Harberger A. C. (2011a). Economic Prices for Non-Tradable Goods and Services, DDP 2011-11, John Deutsch International, Queen's University, Canada.
Available at http://jdintl.econ.queensu.ca/discussion-papers/

Jenkins, G. P., Kuo C. Y. and Harberger A. C. (2011b). Economic Prices for Tradable Goods and Services, DDP 2011-10, John Deutsch International, Queen's University, Canada.
Available at http://jdintl.econ.queensu.ca/discussion-papers/

Annex C: Administrative Manual

National Parameters and Commodity-Specific Conversion Factors Database for the Republic of Uganda
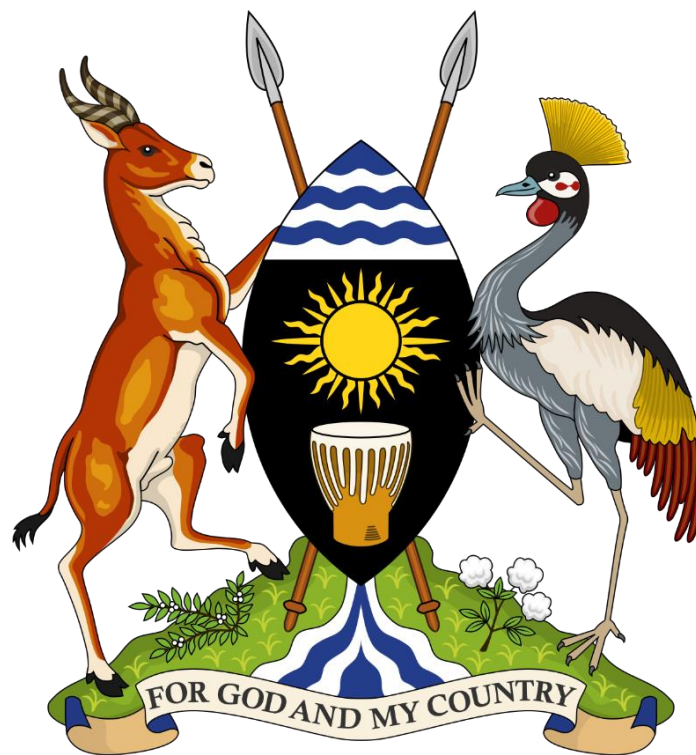
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MANUAL

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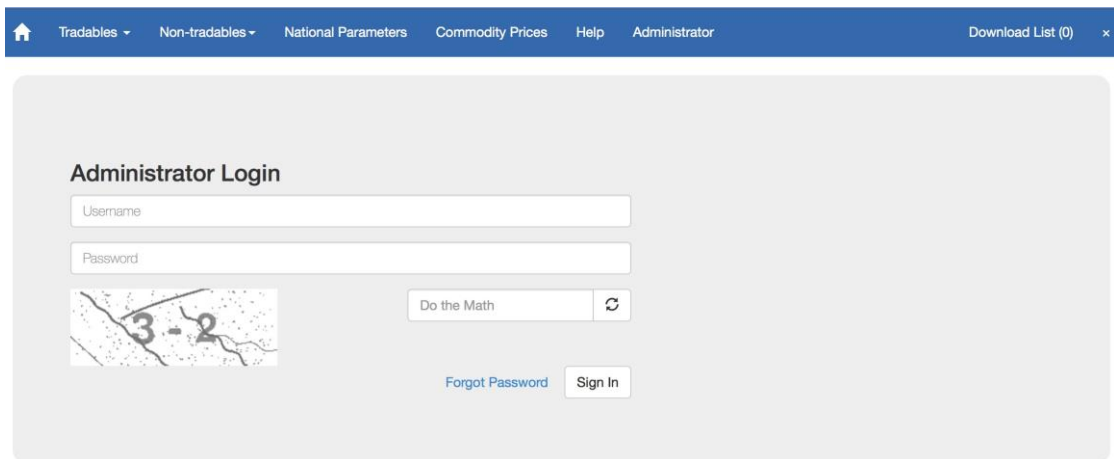
Introduction

This documentation contains step-by-step instructions on how to navigate through the "Administrator" side of the website. It is not a technical documentation and does not contain installation instructions or general user instructions. The manual also contains instructions on the spreadsheets to be used by the admin to update, when necessary, the estimations for the national parameters and commodity-specific conversion factors (CSCF).

How to log in

Login Page

User can navigate to the "Administrator" button from the top navigation menu as shown below.

Figure 1: Administrator Login Page
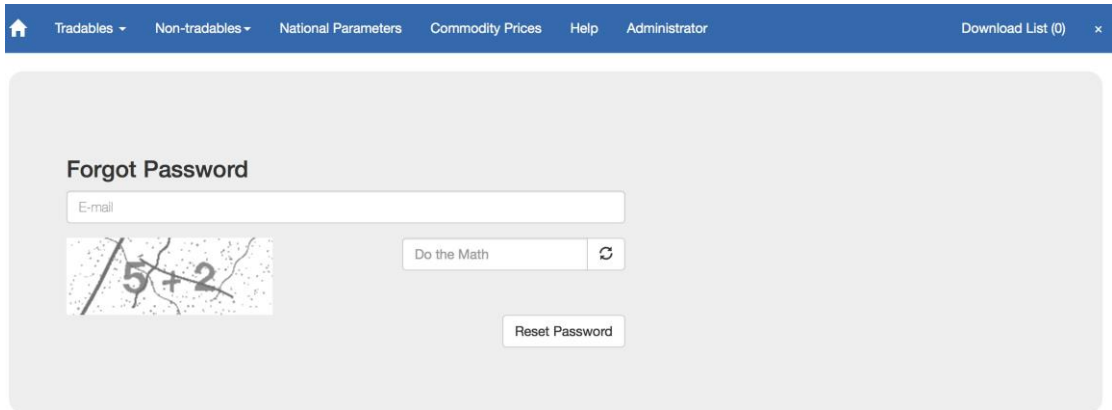
The user will be asked to input the Username and Password as well as a CAPTCHA code. The CAPTCHA code prevents brute force attacks.

After entering the correct username and password, the authorised administrator will be met with a new page where they can perform additional administrator functions.

Forgot Password Page

If a user forgets their password, they can reset it via the "Forgot Password" page. A link will be sent to the user in order to reset their password once they fill out their email address (This should be registered in the system by an IT Personnel) and enter the right CAPTCHA.

Figure 2: Forgot password page

Administrator Panel

Once a user logs into the administrator panel, they have a new host of functions that they can perform which will be explained below.

Figure 3: Administrator Panel
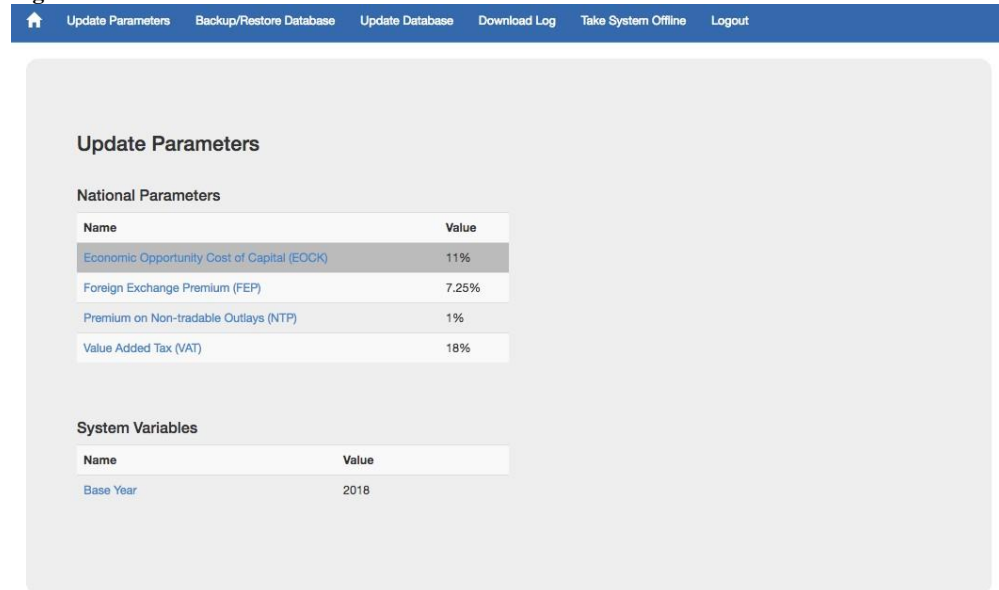
Update Parameters

Update National Parameters

The administrator once successfully logged in can update national parameters. National parameters consist of "EOCK", "FEP", "NTP" and "VAT". In order to edit any of the following parameters, the hyperlinked names can be clicked on to advance to the next stage to input and confirm the numbers.

Figure 4: Update National Parameters Edit Page

The Values are shown in percentages (%). The number format should be kept the same since the numbers that are displayed here affect the overall calculation methods in both the tradables and non-tradables. For example, the current VAT value of 18% should be replaced with the input value of "20%", not "0.20".

Update System Variables

The administrator can also modify the "Base Year", which will update the Calculation "Base Input Value" heading labels as well as the heading in the downloadable excel sheet.

Backup/Restore Database

The backup and restore feature in the administrator panel can be accessed from either the dropdown menu on the top navigation pane or from the button menu in the administrator list.

The backup menu contains a list of backups that are saved on the server sorted by the newest backup to the oldest backup.
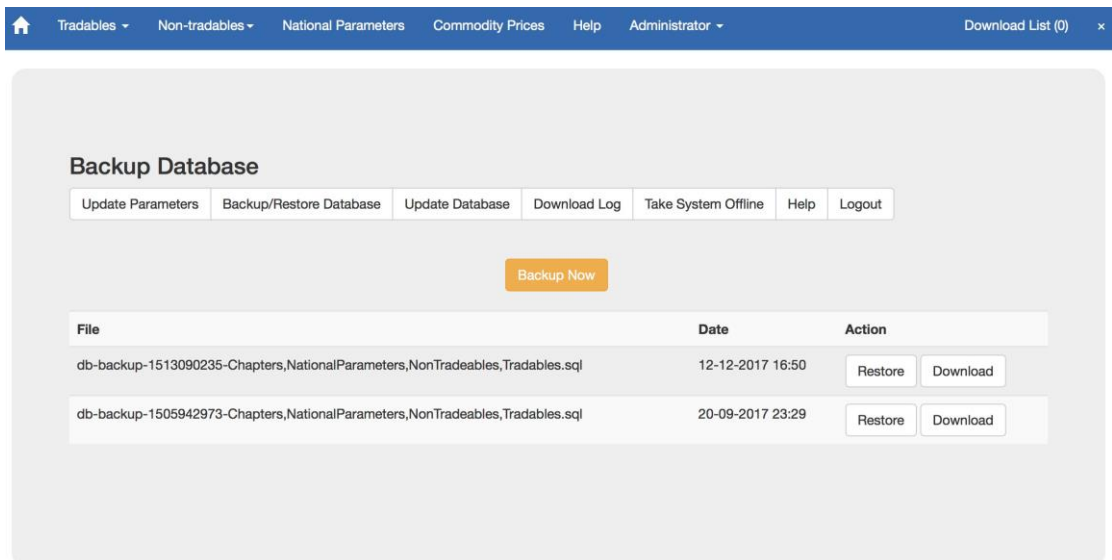
Figure 5: Backup/Restore Page

Each backup file contains a name, a date and an action, either to Restore or Download the certain file to the administrator's hard drive.

To create a new backup file, the administrator must click the "Backup Now" button located at the top of the page and confirm the system warning. After the confirmation, the new backup file will be added to the top of the list.

It is highly recommended to perform a backup before changing any values or updating any of the tables through phpMyAdmin. If any problems arise during an update of a system table, a restore can be performed with no data loss.

Update Database

Update Database page contains a link that redirects to phpMyAdmin as well as the downloadable templates with instructions on how to update the database.

Download Log

This button enables the download of the System Log as a text file, which monitors administrator activities.

Figure 6: Example of the System Log

Take System Offline

This button enables an administrator to take the website offline for maintenance purposes. Unless a user is logged in, they will not be able to reach any user level pages. A user will be given an option to be able to log in if they are not already logged in.
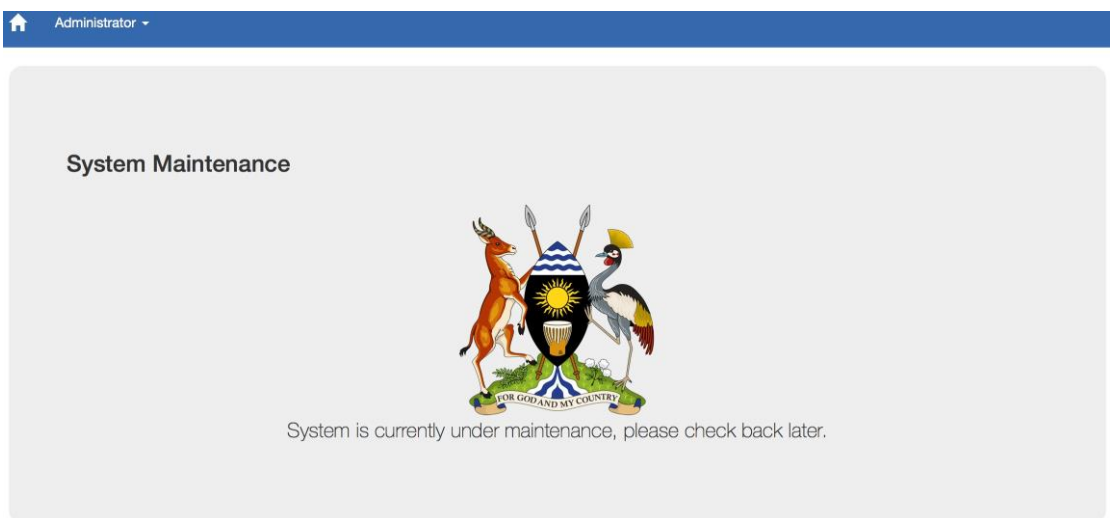
Figure 7: Maintenance page when user is not logged in

The example above shows the maintenance website while a user is not logged in.
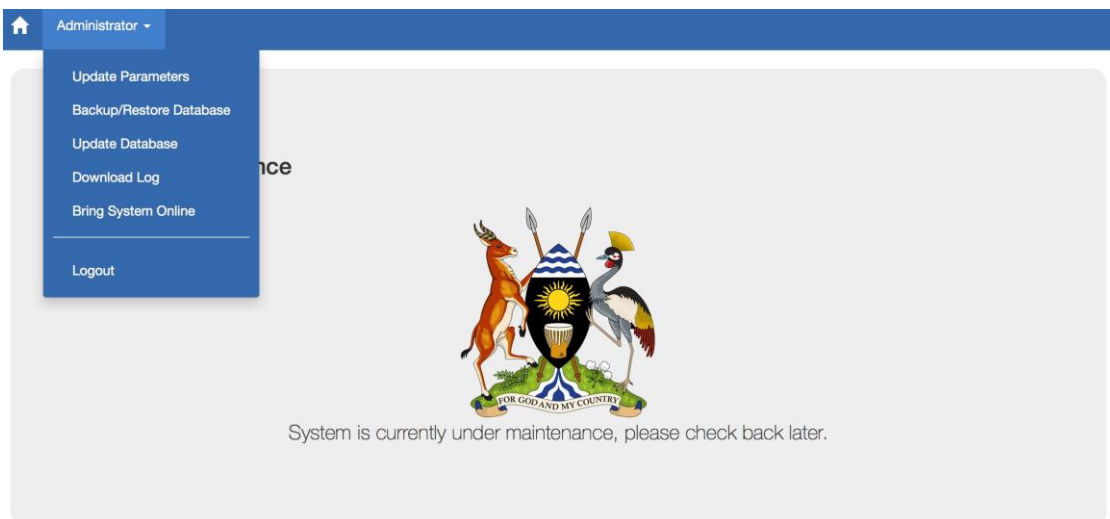
Figure 8: Maintenance page when user is logged in as Admin

Once a user is logged in, they will be able to access all administrator level pages to maintain the website, including bringing the website back online.

Logout

The session will be destroyed and the administrator will have all access revoked. Once logged out, the user will be redirected to the home page of the website.

Administrator Spreadsheets

There are four (four) administrator spreadsheets as follows:

1. Uganda FEP and NTP
2. Uganda EOCK
3. Uganda CSCF Tradables
4. Uganda CSCF Non-tradables

The rest of this section of the manual describes how an administrator can use these files in order to update, when necessary, the estimates for the national parameters and conversion factors.

Uganda FEP and NTP

The file "Uganda FEP and NTP" contains three sheets that are necessary for the estimation of premiums on foreign exchange (FEP) and on non-tradable outlays (NTP).

The sheets and their roles in the estimation procedures are as follows.

- **Parameters for the FEP and NTP:** The parameters used for the estimation of FEP and NTP are contained in this sheet.
- **Estimation of the FEP and NTP:** The 4 (four) scenarios used in the estimation of the premiums are displayed in this sheet. An estimation for the premiums is performed for each scenario, then a weighted average of the calculations is used for the final estimates for the FEP and NTP.
- **Sensitivity Analysis:** This sheet contains the sensitivity tests performed for 3 (three) main parameters used in the estimation of the premiums.

Uganda EOCK

The file "Uganda EOCK" contains multiple sheets that are necessary for the estimation of Economic Opportunity Cost of Capital for Uganda.

The sheets and their roles in the estimation procedures are as follows.

- **Outputs:** This sheet displays the final estimate of the EOCK. The sheet is dynamically linked to all other sheets and is affected by any changes in the parameters or calculations. Following the estimation of the three components of the EOCK, this sheet estimates the EOCK as the weighted average of the components.
- **Inputs:** The parameters used for the estimation of FEP and NTP are contained in this sheet.
- **Total Capital Stock:** This sheet contains capital stock both in nominal and real terms. The capital stock used in other sheets for the estimation of EOCK. The "Return to Domestic Investment" sheet is linked to particular cells in this sheet.
- **Return to Domestic Investment:** This sheet contains the table used for the estimation of the first component of the EOCK, i.e. rate of return to displaced investment.
- **Return to Domestic Saving:** This sheet contains the table used for the estimation of the second component of the EOCK, i.e. cost of domestic savings.
- **MC of Foreign Borrowing:** This sheet contains the assumptions and data used for the estimation of the third component of the EOCK, i.e. cost of additional foreign capital inflows.
- **Sensitivity Analysis:** The sensitivity tests are performed in this sheet for 5 (five) parameters used in the estimation methodology.

Uganda Tradables

This spreadsheet contains detailed information on more than 5,800 tradable commodities sorted according to their Harmonized System (HS) codes. The spreadsheet consists of multiple sheets that are explained below.

- **Database:** As explained in the Admin Panel of the website, the Database sheet is the one to be exported in CSV (Comma delimited) format in order to update the tradables database on the website. All the data in this sheet are linked to the second sheet where the calculations for the conversion factors are conducted.

- **Calculations:** This sheet presents the tradable commodities together with various distortions on them, and calculates conversion factors accordingly. Columns from C to G are the flags used to determine the import duty rates to be used in the calculation of CSCFs. In other words, following the flags in these columns, the import duty rates in those from H to L are used to determine the final rate in column M. Then this rate is used in the estimation formulae.
- **HS and Imports:** This sheet contains detailed import volumes and origins sorted with the HS codes of the imported commodities. First using a detailed database on the import volumes and origins, the import volumes from the rest of the world (ROW), EAC, COMESA A, COMESA B, and COMESA D member states are listed together with the total imports (columns D-I). Then the shares of imports from different origins are calculated in columns J-N. A check is made on the Column O to ensure that total volume of imports is equal to the sum of volumes imported from different origins. Finally, the flags to set the origin in the "Calculations" sheet are determined in columns Q-U.
- **National Parameters:** National parameters are listed in this sheet in order to be linked to the Calculations sheet. This way the parameters which are the global values on the website can be easily updated for simulation purposes.

Uganda Non-tradables

This spreadsheet contains the data and formulation used for the estimation of CSCF for non-tradables. Descriptions for the sheets of the file are as follows.

- **Database:** Similar to the Tradables spreadsheet above, this sheet is to be exported in CSV (Comma delimited) format in order to update the non-tradables database on the website. All the data in this sheet are linked to the other sheet where the calculations for the conversion factors are conducted.

- **Assumptions and Results:** Here all the key assumptions and estimation results are listed. Once any assumption is updated, a new estimation will be presented in the same sheet.
- **Sheets from Construction to Adv. And Market Research CSCF:** Each of these sheets contain detailed information used for the estimation of CSCF for a particular service.

The details of the data used in the columns C-H of the sheets **from Construction to Adv. And Market Research** above are explained below.

- **I-O Coefficients:** The input-output coefficients are presented in this sheet. These coefficients are then applied to the market price of inputs of non-tradables in the Non-tradables spreadsheet (column B in sheets Construction, Electricity, etc.).
- **HS Distortions:** The import duty and excise duty rates levied on various commodities related to inputs of non-tradables are listed in this sheet. The average tax rates are then linked to the particular sheets for non-tradables, i.e. Construction, Electricity, etc., to be used in the calculation of effective tax rates.
- **Sheets from Construction I-I to Adv. And Market Research I-I:** The shares of tradable and non-tradable components of the inputs of the non-tradable services of interest are calculated in this sheet. Furthermore, the effective import duty and excise duty rates to be used in columns F-G in the spreadsheet "Uganda CSCF Non-tradables" are calculated in the same sheet.

Annex D: Training Program Report and Evaluation

Program on Estimation of National Parameters and Economic Analysis

Entebbe, Uganda (October 30 – November 03, 2017)

Summary Report

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Development of National Parameters in Support of Project Appraisal for Projects & Public Private Partnerships

Program on Estimation of National Parameters and Economic Analysis

Entebbe, Uganda (October 30 – November 03, 2017)

Summary Report

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Final Report

Offered from October 30 to November 03, the one-week training program focused on the estimation National Parameters and Commodity-Specific Conversion Factors. The program also covered various aspects involved the appraisal of public investment projects and PPPs including complex issues such as economic aspects of foreign financing and contingent liabilities arising from PPP projects. The program's theoretical and practical parts were selected to equip the GoU with the skills required to effectively and efficiently undertake economic appraisal of the projects. The program, therefore, further contributed to the ongoing effort of the Government to enhance PIM system of the country. CRI was able to complete the entire program as scheduled. The program's academic content, schedule, summary of case study, and syllabus are attached as Appendix II.

Imperial Golf View Hotel in Entebbe, Uganda, was chosen as the program's venue. The venue was found to be an ideal place to focus on such an intensive training program.

A total of **24 participants** attended this training program. There were a good number of officers from the Ministry of Finance, Planning and Economic Development as well as National Planning Authority. The participants found the program in line with the nature of their work and of great value to it. The complete profiles of participants and faculty members are attached as Appendix I.

Participants submitted a detailed **Program Evaluation** at the end of the course. Results of the evaluations are well above the benchmarks and the course was uniformly found to be very useful. All participants, who responded, suggested that their colleagues must also be given the opportunity to participate in this program. A number of useful suggestions were included in the evaluations; these are listed in the recommendations for future programs. The complete evaluation results including the detailed comments by the participants are attached as Appendix III and a summary of the results is attached in the table below.

Relevance of Course Sections and Performance of Lecturers Scale of 1 – 10 1 - poor (inappropriate, irrelevant, unclear, disorganized) 5 - adequate (met expectations, appropriate) 10 - excellent (surpassed expectations, thought provoking, highly relevant)	Average value for each section of the course	9.3
	Average effectiveness of lecturers	8.7
Difficulty of the Course 1 - Too Easy 5 - Just Right 10 - Too Difficult	Average level of the course	5.7
Participants' Feedback on the Course	% of participants recommending the course to others	100%

Appendix I: Participants and Faculty Profiles

Uganda CSCF 2017 Workshop

First Row: Mr. Jauhalu Bwami, Ms. Teddy Namara, Ms. Belinda P. Bisamaza, Mr. James Wokadala, Mr. Ashaba Hannington, Ms. Gertrude Basiima, Mr. Dhizaala S. Moses.

Second Row: Mr. Shahryar Afra (Faculty), Mr. Hennery Sebukeera, Mr. Patrick Ssemyalo, Mr. Simon Peter Sebulime, Ms. Alako Teddy, Ms. Angella Mutesi, Mr. Katabalwa Isaac, Mr. Mikhail Miklyaev (Faculty)

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Appendix II: Program Content

Academic Content

The program covered in detail a range of subjects in economic and stakeholder analysis techniques. As a part of the course work, each participant applied the knowledge and skills s/he had acquired, to calculate the economic conversion factors of a number of tradable and non-tradable commodities and completed economic analysis of an investment project.

The total number of lecture hours was 19 (nineteen), plus 11 (eleven) hours of computer laboratory and case analysis. Participants were expected to achieve the following learning objectives upon successful completion of this program:

- Evaluate the financial and economic viability of investment projects from alternative perspectives

- Calculation of the economic conversion factors of tradable and non-tradable commodities.

- Analyze stakeholders' losses and gains

In addition to the objectives listed above, participants achieved a high degree of proficiency in the use of computer. Specifically, participants enhanced their skills in the use of:

- Economic, and stakeholder analysis modeling of investment projects using MS Excel®

Program Schedule: Week 1

	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
8:30	Opening Remarks by Director Budget **Course Commencement** Integrated Investment Appraisal	Principles Underlying the Economic Analysis of Projects	Economic Opportunity Cost of Capital	Economic Prices for Non-Tradable Goods and Services	Economic Analysis of RUFT Case using Estimated CFs and National Parameters
10:45	Break	Break	Break	Break	Break
11:00	Introduction to the Conversion Factors Database	Economic Cost of Foreign Exchange	Economic Prices for Tradable Goods and Services	Evaluation of Stakeholder Impacts	**Participants Presentation of Major Cases** **Closing Ceremony**
13:00	Lunch	Lunch	Lunch	Lunch	Lunch
14:00	Micro economics I for Economic Valuation	RUTF Case Presentation and Handout Distribution	Estimation of Conversion Factors for Tradable Goods and Services: RUTF Split Case 2	Estimation of Conversion Factors for Non-Tradable Goods and Services: RUTF Split Case 2	
15:30	Break	Break	Break	Break	
15:45 - 17:00	Micro economics II for Economic Valuation	Financial Analysis of the RUTF Split Case 1	Estimation of Conversion Factors for Tradable Goods and Services: RUTF Split Case 2	Economic Analysis of RUFT Case using Estimated CFs and National Parameters	

Split Cases:
1. Financial Analysis of the Production of Ready to Use Therapeutic Food (RUTF) Project in Uganda.
2. Estimation of National Parameters and Economic Analysis of the RUTF Project in Uganda.

Summary of the Case Study

Participants spent most of the afternoons working on practical aspects of the course. The main objective of the case was to familiarize the participants with the application of commodity specific conversion factors.

The work on the case started in the second day of the week, where the participants completed a financial analysis of a feasibility study of **a domestic production of a Ready to Use Therapeutic Food for Improved Nutrition** (RUTF). The limited duration of the program did not allow the participants to complete a financial analysis of the investment project from scratch, however, case study was designed to provide an overview of the comprehensive financial analysis and increase participants skills in analyzing the financial viability of the proposed project.

On Wednesday participants commenced the work on the economic and stakeholder part of the case . Participants calculated the Economic Conversion Factors for specific tradable and non-tradable items used in the project. The estimated conversion factors were used to derive the economic resource flow statement based on the financial cash flow. Distribution analysis was used to analyze impacts of the project on different stakeholders.

Day 1 - Monday, October 30

8:30 - 10:45	**Intergrated Investment Appraisal**

References/Readings:
1. Jenkins, G.P., Kuo, C.Y., and Harberger, A.C., "Chapter 1: The Integrated Analysis", Cost - Benefit Analysis for Investment Decisions, (2012).
2. Jenkins, G.P., Kuo, C.Y., and Harberger, A.C., "Chapter 2: A Strategy for the Appraisal of Investment Projects", Cost - Benefit Analysis for Investment Decisions, (2012).

10:45 - 11:00	**Break**
11:00 - 13:00	**Introduction to the Conversion Factors Database**
13:00 - 14:00	**Lunch**
14:00 - 15:30	**Micro-economics I for Economic Valuation**

References/Readings:
1. Dhakal, D.N.S., Lecture Notes on "Foundations of Applied Microeconomics for Investment Appraisal," Cambridge Resources International, (2005).

2. Boardman, A. et al., "Chapter 3: Basic Microeconomic Foundations of Cost-Benefit Analysis", Cost Benefit Analysis: Concepts and Practice, Prentice Hall; 3 edition (Dec 25, 2005).

15:30 - 15:45	**Break**
15:45 - 17:00	**Micro-economics II for Economic Valuation**

References/Readings:
1. Dhakal, D.N.S., Lecture Notes on "Foundations of Applied Microeconomics for Investment Appraisal," Cambridge Resources International, (2005).

2. Boardman, A. et al., "Chapter 3: Basic Microeconomic Foundations of Cost-Benefit Analysis", Cost Benefit Analysis: Concepts and Practice, Prentice Hall; 3 edition (Dec 25, 2005).

Day 2 - Tuesday, October 31

8:30 - 10:45   **Principles Underlying Applied Economic Analysis of Projects**

References/Readings:
1. Jenkins, G.P., Kuo, C.Y., and Harberger, A.C., "Chapter 7: Principles Underlying the Economic Analysis of Projects", Cost - Benefit Analysis for Investment Decisions, (2012).

2. Boardman, A. et al., "Chapter 4: Valuing Benefits and Costs in Primary Markets", Cost Benefit Analysis: Concepts and Practice, Prentice Hall; 3 edition (Dec 25, 2005).
3. Harberger, A.C., "Three Basic Postulates for Applied Welfare Economics: An Interpretative Essay", Journal of Economic Literature, Vol 9 (1971), pp. 785 – 797.

10:45 - 11:00   **Break**

11:00 - 13:00   **Economic Cost of Foreign Exchange**

References/Readings:
1. Jenkins, G.P., Kuo, C.Y., and Harberger, A.C., "Chapter 9: Shadow Price of Foreign Exchange and Non-tradable Outlays ", Cost - Benefit Analysis for Investment Decisions, (2012).

2. Jenkins, G.P., Harberger, A.C., Kuo, C.Y., and Mphahlele, M.P., "The Economic Cost of Foreign Exchange for South Africa, "The South African Journal of Economics, Vol 71:2, (June, 2003), pp. 298-324.

13:00 - 14:00   **Lunch**

14:00 - 15:30   **RUTF Case Presentation and Handout Distribution**

Exercise Materials:
1. RUTF handout and spreadsheet template.

15:30 - 15:45   **Break**

15:45 - 17:00   **Financial Analysis of Major Case**

Exercise Materials:
1. RUTF handout and spreadsheet template.

Day 3 - Wednesday, November 1

8:30 - 10:45

Economic Opportunity Cost of Capital

References/Readings:

1. Jenkins, G.P., Kuo, C.Y., and Harberger, A.C., "Chapter 8: Economic Opportunity Cost of Capital ", Cost - Benefit Analysis for Investment Decisions, (2012).

2. Jenkins G.P., Kuo, C.Y., and Mphahlele, M.P., "The Economic Opportunity Cost of Capital for South Africa", The South African Journal of Economics, Vol. 71:3, (September, 2003), pp. 496-516.

10:45 - 11:00

Break

11:00 - 13:00

Economic Prices for Tradable Goods and Services

References/Readings:

1. Jenkins, G.P., Kuo, C.Y., and Harberger, A.C., "Chapter 10: Economic Prices for Tradable Goods and Services ", Cost - Benefit Analysis for Investment Decisions, (2012).

2. Teaching Note: Estimation of Economic Prices for Traded Goods and Services, Queen's University, Canada, (March 2007).

13:00 - 14:00

Lunch

14:00 - 15:30

Estimation of Conversion Factors for Tradable Goods and Services

Exercise Materials:

1. RUTF handout and spreadsheet template.

15:30 - 15:45

Break

15:45 - 17:00

Estimation of Conversion Factors for Tradable Goods and Services

Exercise Materials:

1. RUTF handout and spreadsheet template.

Day 4 - Thursday, November 2

8:30 - 10:45   **Economic Price of Non-Tradable Goods and Services**
References/Readings:
1. Jenkins, G.P., Kuo, C.Y., and Harberger, A.C., "Chapter 11: Economic Prices for Non-tradable Good and Services", Cost - Benefit Analysis for Investment Decisions, (2012).

10:45 - 11:00   **Break**

11:00 - 13:00   **Evaluation of Stakeholder Impacts**
References/Readings:
1. Jenkins, G.P., Kuo, C.Y., and Harberger, A.C., "Chapter 13: Evaluation of Stakeholder Impacts" Cost - Benefit Analysis for Investment Decisions, (2012).

13:00 - 14:00   **Lunch**

14:00 - 15:30   **Estimation of Conversion Factors for Non-Tradable Goods**
Exercise Materials:
1. RUTF handout and spreadsheet template.

15:30 - 15:45   **Break**

15:45 - 17:00   **Economic Analysis of the Major Case Using Estimated CFs and National Parameters**
Exercise Materials:
1. RUTF handout and spreadsheet template.

Day 5 - Friday, November 3

8:30 - 10:45	**Economic Analysis of the Major Case Using Estimated CFs and National Parameters** Exercise Materials: 1. RUTF handout and spreadsheet template.
10:45 - 11:00	**Break**
11:00 - 12:00	**Participants Presentation of Major Cases**
12:00 - 13:00	**Closing Ceremony**
13:00 - 14:00	**Lunch**

Appendix III: Program Evaluation Results

Your comments and opinions are of great value and can help us in improving the quality of the future programs. The following questions are rated on a scale of 1 to 10:

1 - poor (inappropriate, irrelevant, unclear, disorganized)
5 - adequate (met expectations, appropriate)
10 - excellent (surpassed expectations, thought provoking, highly relevant)

Instruction

The following questions are rated on a scale of 1 to 10 and the average responses are reported.

Economic and Risk Analysis

Mr. Mikhail Miklyaev

- Integrated Investment Appraisal
- Principles Underlying the Economic Analysis of Projects
- Economic Prices and Conversion Factors for Tradable Goods and Services
- Evaluation of Stakeholder Impacts

The Value of This Section	9.3	Overall Effectiveness of Lecturer	8.4

What did you like?

- The ability to explain in detail using local and simple examples.
- His expression and knowledge of the matter.
- I loved the lead on guidance with the templates/models.
- The illustrations, and good explanation.
- All the sections in this chapter are relevant in my field of project appraisal.
- Very available and articulate. Patient even when teaching a difficult topic. Excellent Moderator.
- The simplicity of the delivery even for the complex areas.
- All were beneficial to me.
- It was very comprehensive introduction of the course and themes covered bringing out theoretical aspects.
- Friendly lecturer. Willing to listen for all challenges.

- Lecturer was engaging and encouraged full participation of the class.
- All topics.
- The flow of knowledge.
- Relevancy of the topic.
- The delivery mechanism and choice of examples is adequate.
- I liked the fact that Mr. Mikhail was very approachable and elaborate in his explanations.
- Calm in delivery of subject. Improved of the subject.
- More time to be given on practical sessions or they be done concurrently for better understanding.

What did you dislike?

- Everything was ok.
- N/A
- Limited time.
- N/A
- NA
- None
- The lectures were so teacher centered.
- Whilst a good material, a lot more time is required to fully grasp issues.
- None
- Nothing
- Not enough time to internalize the work.
- He was not clear on some issues.
- Lower tone in delivery of matter. Not very audible articulate.
- Nothing: All was ok.

Mr. Hasan Altiok

- Micro-Economic I for Economic Valuation
- Micro-Economic II for Economic Valuation
- Economic Cost of Foreign Exchange
- Economic Opportunity Cost of Capital
- Measurement of Economic Prices for Non-Tradable Goods and Services

The Value of This Section	9.2	Overall Effectiveness of Lecturer	9.3

What did you like?

- Articulation of the concepts in the above topics was great. The lecturer ensured that everyone was on board all the time.
- He is a good teacher. He challenges you to understand. Makes hard things simple.
- The detailed explanation for such formulas as Marginal Cost of Foreign Capital among others.
- Great at illustrating and explaining concepts and illustrations
- The presentation skills and the simplified approach conducting lectures was superb.
- An amazing teacher and very illustrative. Excellent delivery.
- Set a good foundation for the course. Very effective delivery by the lecturer.
- All was good to me
- The lecturer made recaps and referred to and summarized the course. This made it easy for participants to recall and build on themes thought.
- The lecturer was real teacher explaining to the extent that you understand. The lecturer was friendly. Easy concept to comprehend.
- Very well structured in such a manner that students recall from past studies of economics. Easy to understand and grasp concepts.
- I liked all the topics.
- The linkage of microeconomics to projects
- Lecturer understands the concepts.
- The delivery mechanism is adequate and suitable for progressive learning and appreciation of the course content.
- The use of simple examples to make complex work very easy.
- Very articulate. Very empowered of the subject.
- More time on practical session.

What did you dislike?

- He has command but which is good.
- N/A
- Nothing
- N/A
- None
- None
- The lecturer is not patient with the slow learners.
- Very compressed structure, more time would be required to fully appreciate what is being told.
- None
- Not enough time to understand the topics.
- The illustration (graphical) were not very clear on the board and needed more time to be fully appreciated.
- Nothing
- All was fine.

Mr. Shahryar Afra

- Introduction to the Conversion Factors Database
- RUTF Case Presentation

The Value of This Section	9.3	Overall Effectiveness of Lecturer	8.5

What did you like?

- Tutor was very approachable and provide great one on one sessions on practical during laboratory sessions.
- He is technically good and intelligent.
- The case by case leading of him has helped me conceptualise CSCF.
- Organized and good illustration.
- This section is important in our induction to the applicability of National parameters.
- Good delivery though soft spoken. Handled difficult practical sessions with patience.
- The practical aspects were very helpful.
- All was useful to me.
- The example was very good bringing out the practicality of what was taught. This improved on the participants knowledge of the course content.
- Friendly lecturer. Explains not deeply.
- Course is very good and step by step guidance made it easy to conceptualize what was being taught.
- I liked both topics.
- The relevancy of the topic.
- The delivery mechanism is appropriate for the course.
- The practical bit of the work was very exciting though challenging. Explanations were thorough and clear.
- Informed of the subject. Knowledgeable about subject.
- He is very good at explaining and understood most of this content.
- More time on practical issues.

What did you dislike?

- Very hard to understand and not audible enough.
- N/A
- a bit inaudible, / inadequate explanation during lectures
- N/A
- None.
- These examples should have been two. One to be done with the lecturer in call and another to be done by the participants as coursework. Then solution to both be provided by the lecturer at the end of the course.

- No good explanations. Fast in delivery.
- Again, needed more time to fully grasp.
- None.
- Most of the results were already determined.
- He was not very audible and was occasionally quiet.
- Assured his class understood well.
- All was good.

Laboratory

Mr. Hasan Altiok

Approachability and Responsiveness	9.2	Overall Effectiveness	9.5
Degree of preparation	9.8	Ability to explain material effectively	9.6

Suggestions for Improvements:

- Slow by slow steps.
- He should continue with the receptive simplified demonstration. Return to Uganda for future trainings.
- NA
- More time to be allocated to the practical sessions
- Needed more time on the exercises
- More case studies
- The lecturer should also move around assisting students on the individual basis. Nevertheless, he is very brilliant and fast individual.
- Patience with slow learners since we all understand at the same space.
- More in class assessments should be done so that students fully understand. However, even with what was provided clear understanding was achieved.
- Should explain concepts from first principles.
- I think Mr. Hasan is good the way he is.
- None

Mr. Shahryar Afra

Approachability and Responsiveness	9.3	Overall Effectiveness	8.7
Degree of preparation	9.5	Ability to explain material effectively	8.6

Suggestions for Improvements:

- To be more audible and slow.
- Should keep up the willingness to help as he did throughout. Return to Uganda for future training.
- improves on the way explanations are made.
- More time to be allocated to the practical sessions.
- The time was limited for the exercises.
- More case studies.

- The lecturer should improve his auditability a little more. This captures the attention of learners.
- Explanations need improvement. Need to include learners in his delivery.
- Very good overall, but needs to be more engaging.
- Should explain concepts from first principles.
- He should be more assertive and more involved in providing clarifications.

Assignments

Financial Analysis of the RUTF Split Case 1:

On a scale of 1 - 10, rate the usefulness/appropriateness of the problem set: **7.9**

What did you like?

- The challenge to use excel and to a cash flow.
- I loved the analysis of the foreign source of financing. Very relevant sector considerations.
- Able to make the participants understand the concepts being taught
- The assignments were simplified and the facilitators explained the instructions well.
- Very appropriate and gives in-depth understanding of the content.
- The principal aspects of the assignment.
- All was useful
- To begin with first principle explaining each element.
- Very good practical example.
- I liked the general presentation of the database and the approach on answering them.
- Deep understanding and application of interest rates, NPV $ IRR.
- Relevant to the training.
- The case is able to provide detailed costs and benefits and hence guide computation at all the various levels required.
- It was great.
- It was quite easy.
- The ability to inform on the cases related to a program.
- Applicability in Uganda Context.

What did you dislike?

- Nothing
- N/A
- limited time for participant to internalize the material
- N/A

- The major aggregates for the inflows and outflows had already been filled in the template
- Time was too short
- None
- The lecturer did not tell us from the beginning where we were heading. Although it was very necessary.
- None
- Not enough time to understand the concepts.
- Not very challenging.
- It is not the final means of the benefit of a project.
- The questions are very simple. I would prefer that we first have a hand on without the excel template to internalize the formula.

Estimation of Conversion Factors for Tradable and Non-Tradable Goods and Services:

On a scale of 1 - 10, rate the usefulness/appropriateness of the problem sets: **9.1**

What did you like?

- The factors that externalities are incorporated into the computations.
- It was easy to do after understanding it.
- Very relevant in computing the economic analysis results in outweighing the negative outcomes of Financial Analysis.
- Very useful.
- They were well explained straight from the derivations.
- All was good.
- Easy to grasp and understand.
- Estimation of tradable and non-tradable goods and services.
- Understanding the difference and application of tradables and non-tradables goods.
- Relevancy.
- The problem case provided a variety of examples to enable comprehensive learning for tradables and non-tradables.
- The explanations on the tradables goods and services was very good.
- The fact that this helps disaggregate the project that are beneficial to the country when implemented and when not should be implemented.
- Finally got to apply the economics to the day to day operation of projects.

What did you dislike?

- Nothing
- N/A
- Limited time for participants to internalize material
- N/A

- None
- Interpretation of CFs wasn't fully understood.
- None
- Most of the lines were already determined.
- The graphs were quite many and very confusing.

Economic Analysis of RUTF Case Using Estimated CFs and National Parameters:

On a scale of 1 - 10, rate the usefulness/appropriateness of the problem sets: **8.6**
What did you like?

- It gives an insight on the usefulness of projects to the economy/society.
- The use of short cuts to fill the sheets, learnt something new.
- The detailed nature of handling the distortions making the secondary cash effects.
- Very useful
- Every conversion factor was well explained and further, their use was also elaborated.
- Very practical.
- Reflected Reality.
- Practical reference to tax applications.
- Very useful and good case study to learn from.
- All areas.
- Learning the difference between financial and economic analysis.
- Relevancy.
- The case is able to provide detailed costs and benefits and hence appropriate for guiding learning.
- Everything was easy.
- Helps to know when were we on externalities.
- To make us understand more on excel application. (time was a constraint)

What did you dislike?

- Nothing
- N/A
- Limited time for participants to internalize material.
- N/A
- There was no session on Risk analysis.
- Limited number of stakeholders that made it just academic.
- None
- Already determined results.
- We were rushed through the entire lesson and didn't get enough time to conventionalize everything.
- Would still prefer going into the excel template after internalizing the formula.

Program Summary

Time Allocation

How would you rate the amount of time devoted to the following components of the program?

1 - Too Little   5 - Just Right   10 - Too Much

1	Economic Analysis	**5.3**
2	Stakeholder Analysis	**4.2**
3	Computer Techniques	**4.5**
4	Financial Analysis of the RUTF Case	**4.6**
5	Estimation of the Conversion Factors	**4.2**
6	Economic Analysis of the RUTF Case	**4.6**

Suggestions and ideas for improvement:

· In future, this program should be allocated more time, so that students can have time to internalize the concepts.

· We need the fully syllabus to be done into 2 weeks each (4 weeks in total)

· More time should be allowed in case of organising for such training.

· N/A

· The program should be at least 2 weeks.

· Case study could include more complex situations with more stakeholders, environmental assessment, etc.

· Based om the compressed nature of the course time allocated was not adequate.

· Increase number of days for training

· More time needed.

· Each topic should be done within at least two days. (Practical and Theory)

· Move time required for the construction of financial statements and cashflow statement.

· The modules should be given enough time to enable participants appreciate them and fully understand.

Difficulty

Judging the course as a whole, how would you evaluate the following:

1 - Too Easy   5 - Just Right   10 - Too Difficult

1	Level of Course	**5.7**
2	Range of Topics covered	**5.4**
3	Overall length of course	**5.5**
4	Amount of required reading	**6.0**
5	Emphasis on quantitative skills	**6.0**
6	Emphasis on case studies	**5.1**
7	Emphasis on computers	**5.3**
8	Emphasis on policy	**4.8**
9	Emphasis on practical skills	**6.3**
10	Opportunity for class discussion	**5.7**

What did you like about the Program?

- It gives great insights in evaluations of public sector investment projects, the basis for appraisal, acceptance and rejection of projects.
- Need more practical examples (Day today life) examples to discuss
- I love the economic interpretation of the case studies. They were helpful in understanding the lecture notes.
- The material distributed is very explicit and beneficial
- The program was conducted in reference to project appraisal.
- The program is practical given we used examples of real projects
- Short but very useful.
- Very useful in current work schedule of duties.
- The program is very practical hence gives enough room for learning.
- It is very relevant to my work.
- Relevant
- The facilitators we've adequately prepared and the examples we've sufficient to guide learning.
- The program was well organized to assure gainful benefit to the participants.
- The experience and capability of the lecturers. Applicability of the program in PAP department.

What did you dislike about the Program?

- The program was short and hence there was limited time to internalise the concepts.
- It was too short.
- N/A
- Short timeframe allocated for the program.
- N/A

- Very short.
- More time is required.
- The time for understanding the content is too little.
- nothing
- Little time to understand the program. Less practical lessons.
- The program was so compressed and yet if it had been accorded enough time it would have been easily understand. It was an exhausting program.
- Little time allocated.

Would you recommend that a colleague or staff member in your organization attend the program in the future? (Please check one)

Definitely Yes: **20**
Probably No: **0**
Definitely No: **0**

Comments

- This is a very great program as it provides a great insight in Economic Evaluation of projects.
- Thanks for working with us/Uganda.
- Me too would love to get the entire course.
- Great training, more time needed by participants to practise in order to grasp concepts.
- The program was conducted in a well-organized manner.
- It is a very good program, that provides a theoretical justification for CBA as a decision tool.
- The proficiency of the lecturers and the easy of delivery
- All was ok.
- Very engaging lecturers and very approachable. Overall a wonderful course.
- This is a very important course and it is important that more people undertake it.
- The course should be given more time so that more time can be given on practical aspect of