Estimating national economic parameters for Namibia

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Abstract

This paper estimates national economic parameters to be used for project appraisal in Namibia. The shadow prices of capital, labour and foreign exchange are derived. The results suggest that the economic opportunity cost of capital is 7.2%. The economic costs of Namibian labour as a share of financial costs are 32% for urban semi- and unskilled labour, and are 54% for rural semi- and unskilled labour. The economic costs of foreign labour as a share of financial costs are 59%. The shadow exchange rate factor is estimated to be 4% for the Namibian economy.

Keywords: shadow prices; discount rates; Namibia

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1. INTRODUCTION

The purpose of this paper is to estimate shadow prices of capital, labour and foreign exchange for the Namibian economy. *Shadow prices* are defined as the opportunity costs of inputs and outputs consumed or produced by a project (Potts 2002). The value that a resource could have generated elsewhere in the economy is lost if the resource is moved to a project. Therefore, shadow prices are calculated to take into account the true opportunity costs of resources, inputs and any externalities resulting from a developing programme or project.

In many markets, especially in developing countries, financial or market values differ from their real economic values due to distortions brought about by imperfect or underdeveloped markets, government protection policies, and other externalities (Behrman 1986). The most emphasised distortions are with regard to unskilled labour, the cost of foreign exchange, and the cost of financial capital.

Shadow pricing is then used to account for these distortions and value resources to approximate their actual value. The use of unadjusted market prices for labour and capital might lead to underestimating the real costs of capital-intensive projects and tend to promote these at the expense of socially less costly labour-intensive projects. The existence of high levels of nominal and effective tariff protection, in combination with import quotas and overvalued exchange rates, discriminates against the agricultural sector in favour of the import-substituting manufacturing sector. In addition to reflecting – incorrectly – the real terms of trade between, for example, agriculture and industry, such distorted domestic

product prices tend to favour upper-income groups disproportionately in relation to society's lower-income groups.

Thus, the estimation of shadow prices is essential for the practical application of the economic analysis of project evaluation. By way of cost-benefit analysis, project evaluation aims to induce allocation efficiency in the use of a country's resources (Campbell & Brown 2003).

Despite its importance for sound developmental planning, the application of shadow pricing in Namibia has been limited or virtually non-existent. This is unfortunate as Namibia's development strategy, as encapsulated in the five-yearly National Development Plans and in its Vision 2030, underpins the importance of development/investment programmes in addressing the challenges of poverty, high unemployment and inequality, and low industrialisation.[2] Moreover, the launch in 2004 of the Development Bank of Namibia to fund long-term infrastructure projects increases the need to understand the economic costs and benefits of its funded projects. Potential large-scale projects such as the development of the Kudu gas fields, transfrontier tourism parks, and other infrastructure projects would need to be assessed on both financial and economic grounds. Thus, the practical application of shadow pricing in the economic analyses of Namibia's development projects would help ensure that its scarce resources are optimally utilised, and would help attain the country's targets as set out in its development strategy.

[2] Shadow prices are consistently used in the Ministry of Environment and Tourism (MET), but these are based on educated guesswork rather than real estimates. This framework assumes the economic opportunity cost of capital at 8%, an adjustment (up by 6%) to the value of tradable goods to reflect excess demand for foreign exchange, and an adjustment (down by 65%) to unskilled labour costs to reflect unemployment (Barnes 1994).

Estimating shadow prices for the Namibian economy is also interesting from an academic point of view. Namibia has special features that are not commonly found among other developing countries. Namibia's gross domestic product (GDP) per capita of US$3,100, at 2005 market exchange rates, is relatively high for a developing country. However, according to the World Bank's World Development Indicators for 2006, Namibia has the world's highest Gini index (74.3, compared with Botswana's 63 and South Africa's 57.8).[3] This implies an uneven income distribution that amplifies the interest to estimate shadow wage rates.

The Namibian economy has a large service sector (around 58.7% of GDP), which is unusual for a developing country. In addition, independence in 1990 brought considerable changes to the economy's external and internal migration patterns, especially in relation to the labour market. According to Frayne and Pendleton (2001), internal migration and urbanisation in Namibia is growing rapidly, and is driven largely by employment opportunities in urban centres. In the 1990s, the population of Windhoek, the capital city, grew at an average annual rate of 5.4%. Overall, no substantial research has been done in Namibia on either the scale or the possible consequences of skills emigration. However, according to preliminary analyses by Frayne and Pendleton (2001, 2002) and the Migration Dialogue for Southern Africa (MIDSA 2006), Namibian migratory labour (both skilled and unskilled) to South Africa (SA) and other neighbouring countries is very limited: the overall net migration is estimated at 0.47 per 1,000 members of the population.

[3] The Gini index is a measure of the degree of income inequality.

Furthermore, unlike most other developing countries, Namibia is a net capital exporter. Although the economy has high domestic savings, these flow out mostly to SA to seek higher returns. The lack of domestic investment opportunities is cited as one reason for persistent capital outflows (Fitch Ratings 2005). These capital outflows amount to 10% of GDP annually, and continue unabated.[4]

The linkages to SA are not only restricted to Namibia's capital outflows. The two economies are members in regional groupings such as Southern African Customs Union (SACU), the Southern African Development Community (SADC), and the Common Monetary Area (CMA). Namibia's currency is pegged to the SA Rand, while 82% of her total imports are from SA. Some 26% of Namibia's total exports go to SA. The SA economy, being the regional economic powerhouse, is approximately 30 times the size of Namibia's.

Recent work by Harberger et al. (2003), Kuo et al. (2003) and Bicak et al. (2004) has estimated shadow prices for the SA economy for labour, capital and foreign exchange. Since these two countries share similar historical political ties and a current close economic relationship, it would be interesting to compare the results from this work with those from

[4] An anonymous reviewer suggests that this could be a symptom of 'Dutch disease'. However, unlike most other primary product exporters, the Dutch disease phenomenon appears to be a limited risk to Namibia (IMF 2008). This is because Namibian mineral exports have a relatively modest and decreasing share of GDP (20–25%). This share actually overstates domestic expenditures by the mineral sector, as it imports most of its capital equipment and its labour costs are very low (it contributes 2% of national employment). In addition, fiscal revenues from the sector average around 2–3% of GDP. Thus, domestic pricing pressures from the sector are relatively modest, and wage pressures are unlikely to be large.

the SA studies. However, given Namibia's special features not common to a developing economy, it can reasonably be expected for estimates of the two economies' national parameters to be different.

This work will be the first formal exercise to estimate shadow prices for the Namibian economy. The paper is structured as follows: Section 2 discusses economic features pertinent to the estimation of Namibian shadow prices; Section 3 treats approaches to shadow pricing as well as the methodology to be employed; Section 4 describes the data employed as well as the assumptions used for each estimate; Section 5 presents the results; and Section 6 concludes the discussion.

2. FEATURES OF THE ECONOMY PERTINENT TO AN ESTIMATION OF SHADOW PRICES

2.1 Capital market dynamics

The Namibian financial markets exhibit special features that will affect the estimation of a shadow price of capital. As mentioned earlier, overall limited investment opportunities in domestic financial markets have led to sizable outflows of Namibian savings into the liquid and relatively developed South African markets. Membership in the CMA also allows for free capital flows, and requires Namibia to conform to South African exchange control practices for countries outside the CMA. These outflows averaged around N$1.8 billion per year from 1990–1994, and accelerated to about N$2.4 billion per year from 1995 to 2007. Net outflows in both portfolio and other investments drive the capital outflows.

The Namibian economy is primarily resource-based and, thus, has some investments that are highly profitable owing to resource rents. *Resource rents* are economic profits that are obtained by utilising natural resources. These rents exist due to the scarcity of the natural resources in question. Such rents can be an important source of development finance, and countries like Botswana and Malaysia have successfully leveraged natural resources this way. However, in sectors that do not have resource rents, the marginal product of capital appears to drop sharply since many funds are invested outside Namibia.

To stem capital outflows, the Namibian authorities have followed a two-pronged strategy: firstly, imposing regulatory controls to restrict capital outflows, and secondly, developing domestic markets to provide institutional investors with assets denominated in Namibia Dollars. The latter strategy is still in its infancy and has not been developed. In the mid 1990s, the Namibian authorities raised regulatory requirements for both the insurance and pension fund industries (Regulations 15 and 28, respectively), so that 35% of the assets under their management had to be domestic assets (up from an earlier 10%). This action contributed to the growth of the Namibian Stock Exchange due to an increase in dual listings by South African companies. However, even investments in such dual-listed companies were unable to contain capital outflows, and the regulation may not have had much impact on the real economy. As a result, government has proposed further changes to tighten the domestic asset requirements. A 5% minimum for unlisted investments and a 10% maximum on dual-listed shares were among the new proposals gazetted on 4 February 2008.

2.2 Labour market dynamics

The Namibian labour market is governed by a policy framework that includes a Labour Act, a Social Security Act, an Employment Policy, an Affirmative Action (Employment) Act, and incentives for investment and training. However, on balance, unemployment and underemployment remain high. According to the latest Labour Force Survey, conducted in 2004, unemployment was estimated at 36%. The Bank of Namibia Annual Report for 2004 states that underemployment was estimated at 15% of the employed population. Motinga and Tutalife (2006) indicate that Namibia created a mere 22,000 formal jobs between 1991 and 2001. Unemployment falls disproportionately on the youth and the unskilled workforce, while the duration of unemployment is longer in rural areas, and can vary between six months and two years (ibid).

There is also evidence of wage inequality between the skilled and unskilled. Motinga and Mohammed (2002) calculated that the average unskilled person earns 3% of the wages and salaries of top management, and less than 50% of what the average skilled person earns. Westergaard-Nielsen et al. (2003) confirm the huge wage differentials between skilled and unskilled labour. Although there is no formal minimum wage legislation, some industry-specific wage agreements do contain stipulations for minimum wages, namely the construction, agriculture, and security industries. There is also a large informal economy employing at least 133,000 people, of whom 64% are young people. Remuneration in this sector is very low, and there are no benefits such as social security or medical aid.

The presence of a large informal economy and minimum wages, both of which lead to Namibian wages being set higher than the economic opportunity cost of labour, justifies the

case for such an economic adjustment on the grounds of imperfections in the labour markets. The informal economy, which consists of large numbers of small-scale businesses, can be reasonably assumed to be a sector with market-clearing wages. In the formal sector, however, the presence of minimum wages and collective bargaining – and, possibly, efficiency wage issues – leads to wages above the market-clearing levels that exist in the informal economy. As a result, a portion of the 36% unemployed Namibians would prefer formal jobs, but cannot get them due to the presence of these distortions.

2.3 Issues in estimating the foreign exchange premium

Namibia's participation in SACU affects the estimation of the shadow price of foreign exchange (Shadow Exchange Rates, or SERs). SACU groups Botswana, Lesotho, Namibia, SA and Swaziland together under a common external tariff. All customs and excise duties collected by the five SACU members are combined in a Common Revenue Pool (CRP), and distributed to them according to a Revenue Sharing Formula (RSF). The sharing of the revenue from customs duties is determined on the basis of each country's percentage share of total intra-SACU imports, excluding re-exports, and not on the basis of SACU imports from the rest of the world (Flatters & Stern 2005; Kirk & Stern 2005).

Some 82% of Namibian imports are from SA, which increases Namibia's share of revenue from the SACU system (due to the RSF's intra-SACU imports rule). Namibian imports from outside SACU (the remaining 20% of her total imports) are subject to SACU tariffs, but generate very little extra SACU revenue for Namibia: tariff revenues are paid into the SACU system, and Namibia only gets a small portion of that. Most Namibian exports are to countries outside SACU, which therefore do not affect her revenue share from SACU.

Thus, since SACU revenue for Namibia is effectively not linked to the country's out-of-SACU imports, it can be argued that SACU receipts are not relevant to the determination of the shadow exchange rate since they are essentially intergovernmental transfers and do not directly affect the relationship between prices of traded goods at world prices and their domestic prices. Moreover, the SACU revenue pool is gradually declining due to continuing trade negotiations at multilateral and regional levels.

Namibia is part of the CMA, which also includes Lesotho, SA and Swaziland.[5] Apart from Botswana, the CMA has four of the same member countries as SACU; thus, there should be two SERs: one for convertible currency external to the CMA, and one for Rand-based currencies that would have an SER of 1 since there are no trade restrictions between CMA members. The SER to be calculated in this work, therefore, is applicable to transactions with countries outside the CMA, but not to the foreign content of goods purchased from SA. In principle, one would expect the SER – in relation to external economies – to be similar for all members of the CMA because they all use the same tariff structure. However, there might be some variation due to differences in the structure of imports.

[5] The CMA is described as an area of coordination between the monetary and exchange rate policies of its members under the Multilateral Monetary Agreement of 1992. Under the CMA, the Namibian currency is linked one-to-one to the South African Rand, which is also legal tender. The CMA also guarantees free capital flows among member countries, and guarantees access for Namibian government and financial institutions to South Africa's financial markets. See also Tjirongo (1995) and Vollan (2000).

3. ANALYTICAL FRAMEWORK (METHODOLOGY)

This section describes the analytical framework to be used in estimating shadow prices in Namibia. Generally, there are two approaches to shadow pricing that hinge on the assumption of the existence of market distortions (Medalla 1982). The first approach may be generalised as an attempt to estimate shadow prices associated with a first-best optimum. In this approach, if market and shadow prices diverge due to policy failures, then the appropriate shadow prices would be the equilibrium prices that would prevail if the distortions were removed. However, if the divergence is caused by market rather than policy failures, then the absence of first-best corrective measures is itself the essence of the problem of non-optimality. The work by Tinbergen (1958) and Bacha and Taylor (1971) in the case of shadow pricing of foreign exchange is associated with this first approach. As Medalla (1982) states, however, this approach is not yet feasible for shadow pricing primary factors such as capital and labour due to inadequate techniques and data.

The second approach treats present distortions as given and assumes that they might persist over the long run (Medalla 1982). Shadow pricing is then a problem of deriving dual solutions to the welfare optimisation problem, while the distortions are treated as constraints. Under this approach the optimisation problem is usually not formally specified, but it forms the conceptual framework for shadow pricing rules. The resulting shadow prices are referred to as *second-best* shadow prices, representing social costs and benefits of inputs at the second-best optimum. This approach is associated with the work of Little and Mirrlees (1969), Harberger (1972), and Dasgupta et al. (1972).

In this paper we follow Harberger's (1972) approach for two principal reasons. Firstly, according to Khan (1979), this is the correct method of estimating the shadow discount rate, namely where the marginal social value is not equal to the marginal social cost of funds at the market equilibrium due to the presence of various distortions. Finally, and most importantly, utilising this approach will enable comparison of the results with those of Harberger et al. (2003), Kuo et al. (2003). and Bicak et al. (2004) for South Africa.

3.1 The discount rate

The economic literature advances four main methods of computing the discount rate .These are the Social Rate of Time Preference (SRTP), the Weighted Opportunity Cost of Capital (SOC), the Shadow Price of Capital (SPC), and the Economic Opportunity Cost of Capital (EOCK).[6] In terms of applicability, only the SRTP and the EOCK are feasible for the Namibian estimations. However, a brief review of first three methods is presented, with a more substantial review of the EOCK method, which allows for comparison with the South African work.

3.1.1 The Social Rate of Time Preference approach

The SRTP approach is where the discount rate is composed of two factors: the first is a pure rate of time preference based on people's desire to gain short-term gratification, and the

[6] See Boardman et al. (2001), Boscolo et al. (1998), Percoco & Nijkamp (2006), Powers (2003), and Zhuang et al. (2007). These sources offer an excellent and detailed review of the major methods on estimating the discount rate.

second an assumption that per capita consumption will grow over time. The formula for the SRTP is given by the following equation:

$$r = \rho + \theta g \quad (1)$$

where ρ is the utility discount rate, θ is the absolute value of the elasticity of marginal utility of consumption, and g is the projected long-run annual growth of real consumption per capita. The advantage of the SRTP approach is its applicability to the Namibian work on discount rates.

3.1.2 The Weighted Social Opportunity Cost of Capital approach

The SOC approach is grounded on the notion that public investment crowds out private investment, thus producing the need to account for the opportunity cost of the use of resources used in the public project, and which could be used by the private sector. The SOC could be approximated by the marginal pre-tax rate of return on riskless private investments.

Zhuang et al. (2007) mention that a good proxy to be used is the real pre-tax rate of top-rated corporate bonds. The application of the SOC is still contentious, however, both on practical and theoretical grounds. A practical difficulty arises since the computation of the SOC relies on a vast array of possible private sector interest rates which may not be readily available. Some theoretical objections to the SOC follow the argument that the private sector return may reflect individual rather than societal premium for risk. This argument is based on the perspective that people may be more willing to accept risks as a group than as

individuals. Thus, a rate based purely on the pre-tax return in investment may overestimate the discount rate: thereby making it more difficult to obtain a benefit-cost ratio of greater than 1, particularly for projects of a longer tenure (Powers 2003).

3.1.3 The Shadow Price of Capital approach

This SPC approach postulates that, while the costs of a public project can displace private investments, its benefits can also be reinvested in the private sector. Thus, it proposes to convert the gains or losses from an investment project into consumption equivalents. The proper conversion rate is then the shadow price of capital (Percoco & Nijkamp 2006). Estimating the SPC is relatively simple if it is assumed that each dollar invested today yields a perpetual return π that is entirely consumed (Boscolo et al. 1998). Thus, the present vale of the annual flow of consumption is given by π/i, where i is the SRTP. By implication, π/i is the shadow price of investments in terms of consumption. A simple formula that applies when investment returns are perpetual but a proportion of the annual return is reinvested is derived as –

$$SPC = \frac{(1-s)\gamma}{i - s\gamma} \tag{2}$$

where $\gamma=(1+\pi)/(1+i)$, s is the marginal propensity to save, and $s\gamma<1$. The shadow price increases with the fraction of π invested. The SPC is conceptually correct as it allows the use of the SRTP as the social discount rate without ignoring the opportunity cost of displaced investment. However, its practical applicability is constrained due to its stringent information requirements.

3.1.4 The Economic Opportunity Cost of Capital

Finally, the EOCK approach postulates that in a small, open, developing economy like Namibia's, there are three alternative sources of public funds. The first is from individual savers who take resources that would have been spent on private consumption and instead then lead to an increase in domestic savings. The second source is from additional foreign capital inflows. The third is from resources whose investment has either been displaced or postponed by the project's extraction of funds from the capital market (Harberger 1972). Based on these three alternative sources of public funds, the economic cost of capital can be estimated as a weighted average of the rate of time preference applicable to –

- additional savings
- the marginal cost of additional foreign inflows, and
- the rate of return on displaced or postponed investments.

In general, various distortions are associated with each of the three alternative sources of funds.

If the weights of these three sources are expressed in terms of elasticities of demand and supply of funds with respect to changes in interest rates, the economic opportunity cost of capital can be calculated as follows (a derivation of this is given in Appendix 1):

$$EOCK = \frac{\varepsilon_s(S_r / S_t) \bullet \gamma + \varepsilon_f(S_f / S_t) \bullet MC_f - \eta \bullet \pi}{\varepsilon_s(S_r / S_t) + \varepsilon_f(S_f / S_t) - \eta} \qquad (3)$$

For a country such as Namibia, with a fixed exchange rate, high capital mobility, and a highly elastic supply of foreign funds, Zerbe and Dively (1994) point out that the social discount rate will be equal to the international borrowing rate. For Namibia, where the foreign funds are domestic savings, this will be the foreign lending rate (approximately equivalent to South African bond returns, or the returns on other South African financial instruments in which surplus Namibian assets are placed). Thus, in the standard EOCK formula (Equation 3 above), the elasticity of foreign funds becomes extremely high compared with the other elasticities. Equation 3 can, therefore, be simplified as follows:

$$EOCK = \frac{\varepsilon_f (S_f / S_t) \bullet MC_f}{\varepsilon_f (S_f / S_t)} = MC_f \qquad (4)$$

The EOCK in (4) essentially equals the real rate of return from investing Namibian funds in South African long-term financial instruments. South African assets constitute approximately 80% of both total and portfolio investments from Namibia (IMF 2008). Therefore, a good proxy for the amended EOCK will be the average rate of return on long-term investments in South African bond instruments.

3.2 Economic Opportunity Cost of Labour

The EOCL reflects the value to the economy of the set of activities given up by the workers, including the non-market costs (or benefits) associated when they change employment from one project to another (Harberger & Jenkins 2002). Two approaches are generally applied in estimating the EOCL: the value of marginal product of labour foregone, and the supply price of labour (Bicak et al. 2004).

Under the value of marginal product of labour forgone approach, the EOCL is estimated by starting with the gross-of-tax alternative wage earned in previous employment by the labour hired for the new project (marginal product foregone), and then adjusting for differences in other costs and benefits. Under the supply price of labour approach, the EOCL is determined by starting with the gross-of-tax market wage (the supply price) required to attract sufficient workers to the project, and then adjusting for distortions such as taxes and subsidies. The two approaches have different data requirements, levels of computational complexity, and hence, different degrees of operational usefulness (Bicak et al. 2004). However, it can be shown that, theoretically, the two approaches will produce the same result in estimating the EOCL. Since the supply price of labour is more straightforward and easier to use under a wide variety of conditions in the labour market, and the two approaches are equivalent when data are available, the supply price approach is used.

Bicak et al. (2004) also use the supply price of labour approach, making it easy to compare the South African and Namibian results. It appears that the Namibian labour market does not feature any special characteristics other than those of high wage inequality between skilled and unskilled labour, and the large informal economy. There is little international migration, although interregional migration to urban areas is high.[7] Thus, a new project is most likely to attract workers from both the formal and informal sectors, as well as some foreign labour, if needed; but it may also attract some skilled Namibians currently working in South Africa.

[7] Harris and Todaro (1970) postulate that high urban unemployment rates could be explained by rationally behaving unskilled rural migrants seeking to maximise expected income. According to this model, more than one rural worker is likely to migrate for each new job created in the urban sector. The effect of this is that the opportunity cost of the new urban job is greater than the marginal product of one rural worker.

It appears that skilled labour is in scarce supply in Namibia, with very little – if any – unemployment experienced in this sector (LARRI 2005, 2006a; Marope 2005). Managers and professionals earn annual remunerations of between N$250,000 to N$400,000. Around 4% unemployment is found among those with a university education. In such a case, the opportunity cost of skilled labour is assumed to equal the domestic market wage (Potts 2002). In this paper, therefore, we concentrate on the shadow prices for unskilled labour and for foreign labour.

The presence of a large informal economy presents the opportunity to determine the free market wage at which everyone could work. From the Labour Resource and Research Institute (LARRI 2006b), the free market wage can be estimated at N$175 per month. Certain Namibian industries, as alluded to in Section 2 above, have minimum wages, and many wages are determined by collective bargaining agreements. In such markets, the wage rates are above their market clearing rates (Bicak et al. 2004). Because of the minimum wage rates, chronic unemployment exists in this segment of the labour market. The illustration in Figure 1 shows how the EOCL for protected jobs can be determined under the conditions of a linear supply curve and a perfectly elastic demand for labour in the informal economy:

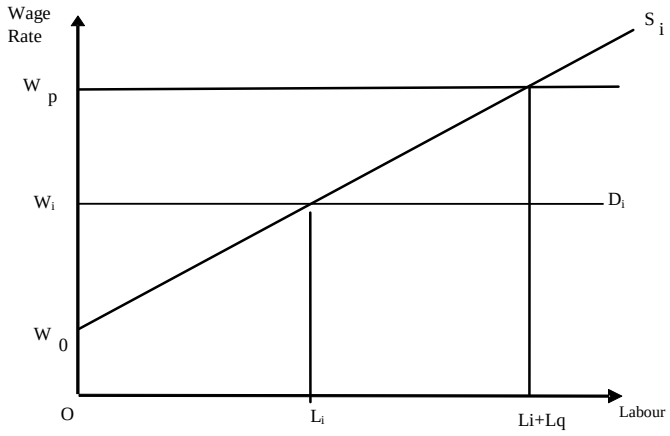

Figure 1: Estimating the Economic Opportunity Cost of Labour for protected sector jobs

Let W_p be the protected sector wage, and let the supply curve of labour for those who are not formally employed be given by W_oS_i. Let L_i be the people who are willing to work at W_i, and let L_q be quasi-unemployed willing to work at W_p but not at W_i. To simplify the analysis, W_i is assumed to be the free market at which everyone could work if they wished. The intersection of this supply curve and the free market wage rate of W_i determine the number of people willing to work at this wage, or L_i in Figure 1. In the Namibian case, W_i would be the informal market wage.

When a project creates a demand for protected workers, such demand will be met partly by those working in the free market (i.e. the informal economy in our case), and partly by quasi-voluntarily unemployed workers (Bicak et al. 2004). If it were assumed that workers are recruited randomly from among all those willing to work for the protected sector wage, the economic cost of these jobs would be measured by the weighted average of the free market wage and the supply price of the quasi-voluntarily unemployed. The EOCL will

then fall between the free market wage (i.e. the informal economy wage in our case) and the protected wage rate. In the case of linear supply curves, the average supply price of the quasi-voluntarily unemployed is measured by $(W_i + W_p)/2$. If any tax adjustments are ignored, then the EOCL for protected sector jobs can be expressed as follows:

$$EOCL_p = f_1 W_i + f_2 (W_i + W_p)/2 \quad (5)$$

where f_1 and f_2, respectively, represent the proportions of the project jobs being filled by those now working in the informal economy and those filled by unemployed individuals who were waiting for new protected project jobs to become available.

The EOCL for skilled foreign labour will be measured by the net-of-tax wage that the worker receives in Namibia, plus an adjustment for the foreign exchange premium that is an additional cost on the share of wages the foreign worker remits back home. A second adjustment is related to the goods and services that foreign workers consume in Namibia. If foreign workers pay any excise or value added taxes on the goods they purchase, these taxes should be deducted from the cost of foreign labour, as they do not represent a cost to the Namibian economy. In some cases, temporary foreign workers might receive subsidised housing or health benefits, for example. These should be added to the EOCL. Combining these factors, the economic opportunity cost of labour for foreign workers ($EOCL^F$) can be estimated as follows:

$$EOCL^F = W^F(1-t^F) + W^F(1-t^F)R[(E^e/E^m)-1] - W^F(1-t^F)(1-R)t^{VAT} \quad (6)$$

where W^F is the gross-of-tax wage of foreign labour, t^F is the rate of personal income tax levied by the host country on foreign wages and salaries, R is the proportion of the net-of-tax income repatriated by foreign labour, E^e is the economic exchange rate, E^m is the market exchange rate, and t^{VAT} is the average rate of value added tax paid.

For labour from South Africa – the main source of skilled foreign labour – coming to work in Namibia, Equation 6 can be rewritten as follows (since $E^e/E^m=1$):

$$EOCL^{FRSA}=W^F(1-t^F)+W^{FRSA}(1-t^F)(1-R)t^{VAT} \quad (7)$$

Similarly, for Namibian skilled labour attracted back home by the project from out-of-country employment, the EOCL will need to adjust for a loss of remittances:

$$EOCL^{skilled\ Nam\ labour}=W^N(1-t^{RSA})R \quad (8)$$

3.3 Economic Opportunity Cost of Foreign Exchange

The wedge between the Shadow Exchange Rate (SER) and the Official Exchange Rate (OER) can be attributed to a combination of two factors: disequilibria in the balance of payments (BOP) and in the protection structure (Medalla & Powers 1984). Namibia does not suffer from a BOP disequilibrium, but does have trade restrictions through SACU. An SER higher than the OER reflects the premium placed on foreign exchange (used or produced) when evaluating projects to correct the distorted relative prices between traded and non-traded commodities. A higher SER does not suggest devaluation but rather revaluation – to the exact degree of the SER estimate. This distortion in relative prices

arises from the protection system (and BOP disequilibrium) and not only affects price relationships among tradable goods, but also distorts the prices of tradables relative to non-tradables. Among tradable commodities, relative price distortion may be corrected in project evaluation by using their relative border prices. However, further correction is needed for the price distortion between tradables and non-tradables. This, in essence, is the role of the SER in project evaluation. It serves as the conversion factor for non-tradables, making their prices consistent with the border prices of tradables. One would ideally prefer to compute a specific conversion factor for each non-tradable rather than use a standard conversion factor such as the SER, but due to the practicalities involved in decomposing non-tradables into their tradable and primary factor components, the SER is easier to compute.

Lagman-Martin (2004) mentions three alternative approaches to estimating the SER. These approaches are generally based on converting the OER to the SER through a conversion factor known as the *SER factor* (SERF). The first approach is employed where an economy enjoys balanced trade. The formula applied involves calculating the SER based on the tariff-adjusted OER, weighted according to import–export shares. A second approach takes into account the sustainability of the country's trade imbalance through an assessment of the Equilibrium Exchange Rate (EER). The use of the EER rather than the OER emphasises the long-term stability of the exchange rate because of its significant effect on project performance. Finally, in the third approach, when tariffs represent the only distortion to trade and there are no distortions in factor or commodity prices, the SERF can be approximated by 1 plus the weighted average tariff rate. This approach is consistent with the accepted definition of the *SER* as the weighted average of the demand price for foreign exchange paid by importers and the supply price of foreign exchange received by exporters.

This simple trade-weighted formula can be represented as (Potts 2002, Lagman-Martin 2004) –

$$SERF = \frac{M(cif) + X(fob)}{(M + M_t - M_s) + (X - X_t + X_s)} = \frac{TT}{TT - NT_t} \quad (9)$$

where M is the total value of imports (*cif* – cost, insurance, freight), X is the total value of exports (*fob* – free on board), M_t is total value of import taxes, X_t is the total value of export taxes, TT is the total value of trade, NTt is the total value of net trade taxes, and M_s and X_s represent import and export subsidies, respectively.

Other, more complex, formulas for the SER can be derived if data are available to indicate the types of imports or exports that change with a concomitant change in the availability of foreign exchange. Such formulas use the elasticity of demand for imports and exports with respect to changes in foreign exchange availability to provide weights for different export and import categories. It is usually very difficult to obtain reliable information on these elasticities, so the simple weighted formulas are commonly used. Harberger et al. (2003) employ a general equilibrium model to estimate the SER for South Africa. Their approach illustrates how the foreign exchange premium could be estimated in an economy where the funds used to finance the purchase of tradable and non-tradable goods are obtained via the capital markets. This framework ensures that all repercussions in the economy due to the purchase of tradable goods for a project are taken into account in a consistent manner. Due to data limitations, this work will employ the simple weighted trade formula presented above. Other methods include using semi-input–output models in order to use the weighted

average of the conversion factors for traded goods. The question as to which formula to use is essentially an empirical one (Potts 2002).

4. DATA

The data are derived from various sources. For the shadow price of capital estimations, the inflation data are derived from the Central Bureau of Statistics' National Accounts from 1996 to 2006, and from the Bank of Namibia's quarterly and annual reports. The rate of return from investing Namibian assets in South African long-term bond instruments was obtained from a local consulting firm, Jacques Malan Consultant and Actuaries.

For the SRTP calculations, we follow Evans and Sezer (2004), where the rate of pure time preference ρ is assumed to be 1.5%, the elasticity of marginal utility of consumption θ is assumed to be 1.3, and the average growth rate of per capita real consumption g is the average annual growth rate per capital real GDP from 1996 to 2006, derived from the National Accounts data. The g was 2.87% over the 1996–2006 period.

The labour estimations used LARRI's Actual Wage Rate Database, the results of the LARRI labour force survey conducted in 2004, the Ministry of Labour's survey on Namibia's informal economy in 2001, and LARRI's study on that economy in 2006. In terms of unskilled labour, we will use the minimum wages determined by LARRI (2005, 2006a) for the various economic sectors in Namibia. The database is derived from wage agreements entered into between various trade unions and corporate entities between 2000 and 2005. This database will represent the urban semi- and unskilled labour pools. We will

also look at special categories such as farm workers and security guards, who are formally paid a minimum wage as set out by legislation.

LARRI (2006b) shows that, on average, the majority of informal workers get paid N$175 per month. The estimated number of people working in the informal sector is 133,000. Unfortunately, there are no disaggregated data available on rural and urban wages. Therefore, wages for the informal sector as well as for farm workers are used as a proxy for rural semi-skilled and unskilled labour. The labour force survey of 2004 estimates that 108,119 people are unemployed. Using these data, we obtain f_1 at 0.55, f_2 at 0.45, and W_f at N$175 to estimate the EOCL equation. For urban semi-and unskilled labour, W_p is the LARRI database's average national wage, namely N$1,475 per month. For rural workers, the W_p is the farm workers' minimum wage of N$428 per month. For estimating the EOCL of foreign labour, t^F is 35%, with t^{VAT} at 15%, and E^e/E^m being the SERF calculated in this study. Finally, we assume *R* (the proportion of the net-of-tax income repatriated by foreign labour) at 40%.

Namibian trade statistics to estimate the forex premium were obtained directly from the Central Bureau of Statistics and the Bank of Namibia reports.

5. RESULTS

5.1 Discount rate estimations

The discount rate estimations using the amended EOCK formula yielded the following:

Table 1: Discount rate calculations: Results of estimations

Method	Discount rate
Amended EOCK	7.2%
SRTP	5.3%

The amended EOCK is 7.2%, whilst the results of the SRTP are 5.3%. Thus, the estimates are slightly lower than the informal estimate of 8% from Barnes (1994). The work by Kuo et al. (2003) estimates the South African EOCK at 11%, which is higher than our estimates.

Zhuang et al. (2007) mention that a major criticism of using SRTP is that it is purely a measure of the social opportunity cost in terms of foregone consumption, and that it ignores the fact that public projects could also crowd out private sector investments if they cause the market interest rate to rise. Therefore, it is necessary to reflect what society could have gained from the displaced private investment that can be measured by the marginal social rate of return on private sector investment. As the SRTP is generally low, if it is exclusively used as the social discount rate it may lead to too many low-return investments being undertaken in the public sector.

5.2 EOCL estimation results

The results of the EOCL estimations are presented in Tables 2 and 3 below:

Table 2: EOCL estimations

Namibian minimum wage, by sector	**Three-year average 2003–2005**	**EOCL**	**Economic costs as share of financial costs (%)**
		W_i assumed at N$175	
Agriculture / hunting / fishing / forestry	1,256	417	33
Community services / social services / personal services	1,676	511	31
Construction	1,415	452	32
Manufacturing	1,366	441	32
Mining and quarrying	1,812	542	30
Transport and storage	1,693	515	30
Wholesale and retail trade	1,104	383	35
National average	1,410	452	32
Economic costs as share of financial costs			**32%**

Table 3: EOCL estimations of special categories

Special categories	**Protected wages**	**EOCL**	**Economic costs as share of financial costs (%)**
		W_i assumed at N$175	
Farm workers	428	231	54
Security guards	588	267	46
EOCL of foreign labour factor	n/a	n/a	59
EOCL of Namibian expatriates	n/a	n/a	28

The EOCL estimations show that, as a share of financial costs, economic costs are 32% for Namibian urban semi- and unskilled labour, and around 54% for rural semi- and unskilled labour. The economic costs of foreign labour and Namibian expatriates are 59% and 28% of financial costs, respectively. In comparison, the informal estimate in Barnes (1994) was that

the economic cost was 35% of the financial cost for all unskilled labour. The estimations by Bicak et al. (2004) show the South African accounting price of unskilled labour at 60%, whilst their Namibian counterpart is at 32%. The South African accounting price for foreign labour is 73%, whereas the Namibian estimations yielded an accounting price of 59%.

5.3 SERF estimation results

The results of the SERF estimation are presented in Table 4 below:

Table 4: SERF estimations (imports and exports for trade with countries outside SACU)

SERF estimations	2004	2003	2002	2001	2000	1999
Imports (*cif*) (N$)	48,494,118	39,233,302	21,112,383	19,137,768	29,366,773	22,431,392
Exports (*fob*) (N$)	81,766,641	117,776,370	64,175,570	55,621,342	52,919,528	27,512,564
Import taxes (N$)	7,185,927	6,362,725	2,314,213	2,503,542	3,714,767	3,103,544
Export taxes (N$)	29,733	25,727	9,044	9,832	10,279	7,241
Net trade taxes (N$)	7,156,193	6,336,998	2,305,169	2,493,710	3,704,488	3,096,303
Total trade (N$)	130,260,759	157,009,672	85,287,953	74,759,110	82,286,301	49,943,956
SERF	**1.05**	**1.04**	**1.03**	**1.03**	**1.05**	**1.06**
SERF, six-year average	**1.04**					

The SERF estimations indicate a value of 1.04. A more general point is that the SER is not a precise figure since it will be used in projections into an uncertain future. Therefore, there are grounds for using a central approximation (or best estimate) and doing some sensitivity tests around the central value. Thus, in appraising projects, it is best to apply a sensitivity analysis using a range of values around the 4% central value. Harberger et al. (2003)

estimate a value of 6.2% for the South African economy, which is higher than this work's estimate. As mentioned earlier in the paper, these estimates are for out-of-SACU trades as the SERF for SACU is 1.

6. CONCLUSIONS

This has been the first formal attempt at estimating national economic parameters for the Namibian economy.

In terms of the amended EOCK, the lower value of 7.2% – compared with SA's 11% – clearly reflects the Namibian net saver position. The estimate is also close to the Barnes (1994) guesstimate, which has been used for the last 14 years. The SRTP low value of 5.3% is best used for public projects that are unlikely to displace private investments, such as food-for-work programmes and other non-profit public sector initiatives. On the other hand, the EOCL estimations for farm workers, which are used as a proxy for semi- and unskilled rural labour, are much higher than the Barnes (1994) guesstimates. The SER estimate, while lower than the Barnes (1994) guesstimates of 6%, is for out-of-SACU trades which the latter work did not realise or incorporate.

The results should be useful for efficient and sustainable development planning in Namibia. Further extensions and enhancements of this work should entail estimating shadow prices using input–output analyses in order to estimate conversion factors for the various sectors of the Namibian economy.

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APPENDIX 1

The economic opportunity cost of capital

Theoretically, the social rate of return may be defined by applying national accounting principles. In an open economy, real income can be different from real product because of the servicing of national debt. Let us assume that *s* is the average interest rate on the stock of foreign debt (*D*). Then income *Y* is given by –

$$Y = q - s\,.D \tag{1}$$

where *q* is the real product. If we then consider a new public project, –

$$\Delta Y = \delta.\Delta I_g + \rho.\Delta I_p - i_f.\Delta D \tag{2}$$

where $\Delta q = \delta.\Delta I_g + \rho.\Delta I_p$. Δq is the permanent change in real product, ΔI_g is the new public project, δ is the rate of return of the project, ΔI_p is the change in private investment caused by the new project ($\Delta I_p < 0$), ρ is the marginal rate of return that the postponed investment would have generated, i_f is the marginal cost of additional foreign borrowing, and ΔD represents the change in the external debt stock.

The decision rule for accepting the project is that the discounted stream of extra income (ΔY) must be higher than the consumption forgone now (change in savings ΔS). Thus, the project should be accepted if the following condition can be satisfied:

$$\frac{\Delta Y}{r} \geq \Delta S \tag{3}$$

This can then be rewritten as follows:

$$\Delta Y \geq r\Delta S \tag{4}$$

Substituting (2) into (4) gives us –

$$\delta\Delta I_g + \delta\Delta I_p - i_f \Delta D \geq r\Delta S \tag{5}$$

$$\delta\Delta I_g \geq r\Delta S + i_f \Delta D - \rho\Delta I_p \tag{6}$$

Thus, for marginal public investment, we have –

$$\delta = r\frac{\Delta S}{\Delta I_g} + i_f \frac{\Delta D}{\Delta I_g} - \rho\frac{\Delta I_p}{\Delta I_g} \tag{7}$$

where $\frac{\Delta S}{\Delta I_g}; \frac{\Delta D}{\Delta I_g}; -\frac{\Delta I_p}{\Delta I_g}$ represents shares of funds sourced from different parts of the capital market. We can then solve the following:

$$\Delta I_g = \Delta S + \Delta D - \Delta I_p = \frac{\partial S}{\partial r}\frac{\partial r}{\partial I_g}\Delta I_g + \frac{\partial D}{\partial r}\frac{\partial r}{\partial I_g}\Delta I_g - \frac{\partial I_p}{\partial r}\frac{\partial r}{\partial I_g}\Delta I_g$$

$$= \left(\frac{\partial S}{\partial r} + \frac{\partial D}{\partial r} - \frac{\partial I_p}{\partial r}\right)\frac{\partial r}{\partial I_g}\Delta I_g \tag{8}$$

where $\frac{\partial S}{\partial r}, \frac{\partial D}{\partial r}, -\frac{\partial I_p}{\partial r}$ represent shares of funds.

The weights of (8) can be written in terms of the aggregate elasticity of each source:

$$\varepsilon_s = \frac{\partial S}{\partial r}\frac{r}{S} \Rightarrow \frac{\partial S}{\partial r} = \frac{\varepsilon_s S}{r}, \tag{9}$$

and similarly for D and I_p. Thus, we have –

$$\frac{\partial S/\partial r}{\partial S/\partial r + \partial D/\partial r - \partial I_P/\partial r} = \frac{\varepsilon_s S/r}{\varepsilon_s S/r + \varepsilon_f D/r - \eta\frac{I}{r}} = \frac{\varepsilon_s S}{\varepsilon_s S + \varepsilon_f D - \eta I} \tag{10}$$

which represents the share of increased savings (weight, f_1). The other two weights can be derived similarly:

$$\frac{\partial D/\partial r}{\partial S/\partial r + \partial D/\partial r - \partial I_P/\partial r} = \frac{\varepsilon_f D}{\varepsilon_s S + \varepsilon_f D - \eta I} \tag{11}$$

which represents the share of increased foreign borrowing (weight, f_2); and finally,

$$\frac{\partial I_p/\partial r}{\partial S/\partial r + \partial D/\partial r - \partial I_P/\partial r} = -\frac{\eta I}{\varepsilon_s S + \varepsilon_f D - \eta I} \tag{12}$$

which represents the share of displaced private investment (weight f_3).

Thus, where ε_s is the supply elasticity of household savings, ε_f is the supply elasticity of foreign funds and η is the elasticity of demand for domestic investment relative to changes in the interest rates. S_t is the total savings available in the economy, of which S_r is the contribution to the total savings by households, and S_f is the total contribution of net foreign capital inflows.

Barreix (2003) mentions that only this market-driven opportunity cost approach is sufficiently flexible to easily add a new source of financing to the analysis. This approach also has another important advantage: it can be defined as a single value. Thus, no extra adjustment on investment expenditures is required, and no classification of benefits and costs are needed.

Barreix (2003) surveys the empirical literature on the estimation of the shadow price of capital and finds that most studies – especially those relating to developing countries – have used the EOCK approach. The standard method for estimating the EOCK for developing countries is captured in the work of Jenkins and Kuo (1998), where it is measured as a weighted average of the rate of time preference to savers (γ), the cost of additional foreign capital inflows (MC), and the rate of return on displaced investment (π). The weighted average of these three costs can be expressed as follows:

$$EOCK = f_1 \bullet \gamma + f_2 \bullet MC_f + f_3 \bullet \pi \qquad (13)$$

where γ, MC_f and π, respectively, equal the costs of the public sector funds obtained at the expense of current consumption, the cost of additional foreign capital inflow to the

economy, and at the expense of other domestic investment. The cost of foreign borrowing (MC_f) is valued at its marginal cost. The weights (f_1, f_2, and f_3) are the shares derived earlier, and are equal to the proportion of funds diverted or sourced from each sector.

If the weights are expressed in terms of elasticities of demand and supply of funds with respect to changes in interest rates, equation (13) can be rewritten as follows:

$$EOCK = \frac{\varepsilon_s(S_r / S_t) \bullet \gamma + \varepsilon_f(S_f / S_t) \bullet MC_f - \eta \bullet \pi}{\varepsilon_s(S_r / S_t) + \varepsilon_f(S_f / S_t) - \eta} \qquad (14)$$