

An Operational Guide to the Estimation of the Economic Opportunity Cost of Labour in South Africa

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Abstract

In most countries the goal of job creation is of paramount political importance. From an economic perspective, however, the benefit of job creation by a project is measured by the amount that the wage bill exceeds the economic opportunity cost of the labour employed. Unlike the economic opportunity cost of capital and the economic cost of foreign exchange, no single national parameter can be estimated for the economic opportunity cost of labour (EOCL). The EOCL varies by occupation, by skill level, by working environment, by labour market condition, and by region. The objective of this paper is to develop a framework with examples that will serve as a guide for the estimation of the EOCLs across a range of circumstances typical of South Africa.

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Section 1 gives a brief overview of the labour market in South Africa, followed by the methods of estimating the EOCL. In section 2 the estimation of the EOCL is illustrated for three cases and then the results are presented of the EOCLs for various types of workers under different employment, taxation and labour market conditions. Concluding remarks are made in the final section.

1. AN ANALYTICAL FRAMEWORK

The rate of unemployment in an economy is a key factor determining the EOCL because the economic cost of labour will be affected by the fundamental causes of the unemployment.

Unemployment in South Africa is high and concentrated in the unskilled or semi-skilled occupational categories but is quite low for those in the skilled occupations². Any unemployment in the skilled labour market is mainly structural unemployment. Overall the market for skilled occupations is relatively tight. Industries that employ less educated workers like construction, manufacturing and mining are getting more capital intensive and shedding jobs, while education intensive sectors such as financial services and trade are experiencing slight increases in the capital : labour ratio but are still creating additional employment.

After 1994, labour laws were enacted to provide a greater flexibility in wage determination and conditions of employment at the same time providing enhanced protection to the workers.³ Minimum wages are determined by collective bargaining between the government authorities, the employers' representatives and the

² In 1999 the official unemployment rate for South Africa was 23.3 per cent, while the extended unemployment rate was as high as 36.2 per cent. This measure includes those members of the labour force that are not actively looking for a job but would accept it when offered. For an official definition of "official unemployment" and "unofficial unemployment," see Statistics South Africa, October Household Survey 1999, (2000).

³ See Stryker, J.D., Cassim, F., Rajaratnam, B., Bhorat, H., Leibbrandt, M. and Plunkett, D., "Increasing Demand for Labour in South Africa," *Equity and Growth Through Economic Research, Public Strategies for Growth with Equity*, (2001).

trade unions for each sector, and for every skill level. For workers, which are not covered in these bargaining agreements, the Employment Conditions Commission is assigned the power to set minimum wages upon request. The effect of these labour laws has been to increase the wage rates of unskilled and semi-skilled labour above their market clearing levels in the formal sector, and to push the excess labour into looking for work in the informal sector.

In estimating the EOCL two alternative starting points for the analysis of this variable may be chosen: the value of the marginal product of labour foregone,⁴ or the supply price of labour.⁵ The supply price of labour approach is relatively straightforward and easy to use under a wide variety of conditions in the labour market.⁶ The starting point of this analysis is the gross-of-tax market wage (the supply price) required to attract people of the required skill level to work on the project. The supply price will capture the worker's preferences regarding the location, working conditions or any other factors that affect the desirability of working for the project. Unlike the marginal product foregone approach where one must measure both of these components separately, the local supply price directly measures the wage and non-wage costs of employing labour for a particular project as a combined package.

Once the minimum supply price of labour has been determined, the EOCL is calculated by adjusting that value to account for distortions that may affect the market wage rate such as income taxes, social security contributions, unemployment benefits and any other such labour tax or subsidy. Care must be taken to ensure that all of the market distortions which drive a

⁴ Little, I.M.D. and Mirrlees, J.A., *Project Appraisal and planning for Developing Countries*, (London: Heinemann Educational Books, 1974)

⁵ Harberger, A.C., *Project Evaluation: Collected Papers*, (Chicago: the University of Chicago Press, 1972), Chapter 7.

⁶ Edwards, A.C., "Labour Supply Price, Market Wage, and the Social Opportunity Cost of Labour", *Economic Development and Cultural Change*, V.38, No.1, (1989).

wedge between the supply price and the economic opportunity cost of labour are properly accounted for when estimating the EOCL for the project.

In certain labour markets, wage rates are determined in relatively competitive markets. The economic cost of labour associated with a project can be measured by the gross of tax supply price, W_g^s , less the income taxes paid if the individual is working at this supply price, plus the income taxes forgone elsewhere in the economy because a share of this labour, H^d , will have been sourced from alternative jobs where taxes were being paid on wages of W_g^a . The remainder, H^s , would be sourced from either informal labour markets or non-market activities where the individuals are not subject to income taxes. The EOCL can be calculated as follows:

$$EOCL = W_g^s (1 - T^s) + H^d W_g^a T^a \quad (1)$$

where T^s is the average rate of income tax paid on the supply price of labour for the project, T^a is the average income tax rate on the wages paid by alternative jobs.

Some projects need to employ the services of foreign skilled workers. The EOCL in this case will be measured by the net-of-tax wage that the worker receives in South Africa plus an adjustment for the foreign exchange premium that is an additional cost on the share of wages that are remitted by the foreign worker. A second adjustment is related to the goods and services that foreign workers consume in South Africa. If the 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 economy of South Africa. In some cases the temporary foreign workers might receive subsidized housing or benefits such as subsidized health benefits. These should be added to the EOCL.⁷ Combining these factors the

⁷ A further adjustment may arise if there are various social security taxes or

economic opportunity cost of foreign workers (EOCL^F) can be estimated as follows:

$$EOCL^F = W^F(1-t^F) + W^F(1-t^F)R[(E^e/E^m)-1] - W^F(1-t^F)(1-R)t^{VAT} + S \quad (2)$$

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, t^{VAT} is the average rate of value added tax paid, 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 S is the value of net benefits gained by foreign workers from subsidized social services.

In South Africa the government regulates the wages in a number of the labour markets or they are determined by collective bargaining agreements. In such markets, the wage rates are above their market clearing rates. Because of the minimum wage rates, there exists chronic unemployment in this segment of the labour market.⁸ This can be illustrated in Fig. 1.

Let W_0S_t be the total supply curve of labour in the market. With the protected wage rate being set at W_p , the total amount of labour supplied in the market at this wage rate would be L_t . There is a limited number of jobs in the economy where the employer is willing to pay the protected wage for this type of labour, L_qL_t . This leaves the supply curve of labour in the free market as W_0S_f . To simplify our analysis we will assume that there is a free market wage of W_f at which everyone could work if they wished. The intersection of this supply curve and the free market wage rate of W_f determines the number of people willing to work at this wage, or L_f in Fig. 1.

When a project creates a demand for protected workers, the demand will be met partly by those working in the free market

fringe benefit charges that are levied on the foreign labour for which they receive fewer benefits than they pay taxes. The excess of taxes paid over the value of benefits received should be deducted in the calculation of the EOCL.

⁸ For a detailed discussion see Edwards, A.C., "Labour Supply Price, Market Wage, and the Social Opportunity Cost of Labour", *Economic Development and Cultural Change*, V.38, No.1, (1989).

and partly by quasi - voluntarily unemployed workers. If we assume 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. Hence, the EOCL will fall between the free market wage and the protected wage rate. In the case of linear supply curves the supply price of the quasi-voluntarily unemployed is measured by $(W_f + W_p)/2$, adjusted for tax externalities. Ignoring any tax adjustments for the moment, the EOCL for protected sector jobs can be expressed as follows:

$$EOCL_p = f_1 W_f + f_2 (W_f + W_p)/2 \quad (3)$$

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

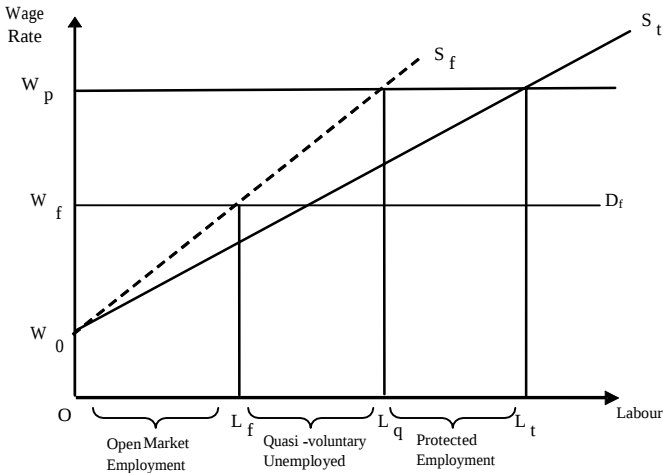


Figure 1. A Protected Labour Market

2. EMPIRICAL ESTIMATION OF THE ECONOMIC COST OF LABOUR

In this section we illustrate the estimation of the EOCL for the three cases outlined above. The results of the estimates of the EOCL using this framework for several types of labour and employment circumstances are summarized in Table 1 below.

The estimation of the EOCL using the relationship described by equation 1 is illustrated for the case of skilled labour hired by a project located in an urban area. The project will pay the prevailing monthly salary for skilled labour (*e.g.*, senior site engineering technician) of, say, R12,830/month⁹ gross of tax and the social security payments. These social security payments include the social insurance premium (12.52 per cent of gross of tax salary), workers' compensation fund for injury (2.55 per cent) and unemployment benefit fund (2 per cent). The total of these payments is 17.07 per cent. The skilled workers are assumed to place a value on the fringe benefits they receive equal to what they cost and to include them in their supply prices. Hence, the supply price of labour in this case will be equal to the total financial cost of labour or R180,240/yr.

The annual before tax salary of R153,960 in 2001 is subjected to R8,720 of site taxes and R35,409 PAYE tax, making the total R44,129/annum. Given the relative tightness of the labour market for the senior engineering technicians, the proportion of the project's workers that are hired away from other jobs, H^d , is assumed to be in the order of 90 per cent. Hence, the proportion of the project's workers met from the increased labour force participation or non-market activities or unemployment is thus 10 per cent.¹⁰

⁹ Paterson Grading at C_U level, at merit level 0, pays this amount to a senior site-engineering technician. Levels, A_1 - A_3 is for unskilled labour, B_1 - B_5 is for semi skilled, CL - CU for skilled, DL - DU for first level management, EL - EU for senior management and F for director. For every level there is a merit sub-levels from 0 to 10.

¹⁰ It assumes that there is no change in the unemployment rate and a quantity

The supply price approach for estimating the EOCL for skilled labour starts with the private supply price and then makes adjustments to it for taxes paid and lost. Gains in the tax revenues from the new employment (R44,129) are deducted from the EOCL, as they are not an economic cost to the economy and are considered a benefit to the government. On the other hand, taxes forgone (R39,716) from the previous employment of the workers are added to the EOCL because the value of the marginal product of labour in the alternative employment must have been large enough for the workers to pay these taxes. By substituting into equation 1 we have,

$$\begin{aligned}\text{EOCL} &= W^p + \text{Fringe benefits} - \text{taxes on supply price} + \text{taxes forgone} \\ &= 153,960 (1 + 0.1707) - 44,129 + 39,716 \\ &= 175,828 \text{ R/annum.}\end{aligned}$$

By dividing its EOCL by its corresponding financial cost, the economic conversion factor for this type of labour is estimated to be 0.98.

The EOCL of non-South Africans employed in South Africa can be estimated by applying equation (2). Suppose an engineer employed abroad prior to his assignment in South Africa accepts a salary of R440,000 per annum to work in South Africa. For the purpose of this example it is assumed that he will be subject to an average income tax rate of 25 per cent, with the average value added tax rate for South Africa being 9.5 per cent. The foreign labours are expected to repatriate 40 per cent of his net-of-tax income. The foreign exchange premium is estimated to be equal to 6.0 per cent.¹¹ The worker receives no subsidy from the government, *i.e.*, $S = 0$. Substituting the above figures in equation (2) yields:

equal to 10 per cent of the new workers hired are entering the labour force or from other informal sector employment.

¹¹ Harberger, A.C., Jenkins, G.P., Kuo, C.Y., and Mphahlele, M.B., "The Economic Cost of Foreign Exchange for South Africa", *South African Journal of Economics*, Vol. 71:2, (June 2003).

$$\begin{aligned} \text{EOCL}^F &= \text{R}440,000 (1 - 0.25) + [\text{R}440,000 (1 - 0.25)] * 0.40 * 0.06 \\ &\quad - [\text{R}440,000 (1 - 0.25)] * (1 - 0.4) * 0.095 \\ &= 319,110 \text{ R/annum} \end{aligned}$$

The economic conversion factor in this case for skilled non-South African labour in South Africa is therefore equal to 0.73.

The application of equation (3) can be illustrated for the situation where an urban project hires unskilled labour and pay wages higher than the market wage rate. In terms of the civil engineering sector, the minimum wage rate in September 2001 was R5.22/hr. or R1,266/month for a general worker at its first merit level (lowest) in Polokwane.¹² The minimum wage rate varies from region to region. Considering the wage rate differential between the informal (R651/month) and formal (R1,266/month) sectors in Polokwane, there will be some unskilled workers who would not like to work in the informal sector but would like to work in the formal sector but are unable to find any work. These workers will have a supply price that is above the informal market wage, but below the institutionally set wage.

Based on equation (3), the EOCL will be estimated by a weighted average of the informal sector wage rate (W^f) and the average supply price of the quasi-voluntary unemployed $[(W^f + W^p)/2]$. The relevant weights are determined as follows. Under a random selection method, the weights are the fraction that the total informal sector employment is of the total supply of unskilled labour, f_1 , (assumed to be 20 per cent) and the fraction of the total labour force that is not working in either the informal or the formal sector and who have a supply price between the informal and formal sector wages is f_2 , (i.e., 80 per cent). Thus, the EOCL of unskilled labour in the formal sector can be estimated at R897/month.

As the project is in the formal sector and unions are involved, the firm will pay the social insurance premiums for the labour.

¹² Unskilled labour works 47.5 hours per week and an additional of 36 hours payment is made as attendance payment. Monthly total working hour is 242.4 hrs ($47.5 * 4.337 + 36$).

The contribution of the employer is 7.52 per cent and that of the employee is 5 per cent, of the amount of the wages paid. The employer is also compelled by law to pay 2.55 per cent of the wages paid to the Workmen's Compensation Fund for injury on duty and 1.5 per cent to the Skills Development Fund. Both employer and the employee have to pay 1 per cent of wages each to the Unemployment Benefit Fund. Furthermore, the employer is compelled to pay 150 hrs of productivity bonus (R783) a year. This is equivalent to R65/month. In total, the financial cost of labour to the employer is R1, 490/month. As the wage rate in the formal sector, R15, 192/annum, is below the tax exempt threshold, the worker is not liable to pay any personal income tax on his wages. Hence, the EOCL for unskilled labour employed in the formal sector is equal to 60 per cent of its financial cost to the employer.

These same concepts can be applied to various types of labour employed in different locations and different labour market conditions. The results of a selected number of such labour market situations in Limpopo Province, including those outlined above, are summarized in Table 1.

Table 1. Estimates of the EOCL in Limpopo Province (rands per month)

Project Location	Level of Skill Acquired	Sources of Workers	Project Wage ^a	Prevailing Market Wage ^a	EOCL	Ratio of EOCL to Project Wage
Urban	Unskilled ^b	Local	651	651	651	1.00
Urban	Unskilled ^c	Local	1,490	651	897	0.60
Rural	Unskilled ^d	Local	468	468	468	1.00
Rural	Unskilled ^e	Local	1,490	468	668	0.45
Urban	Skilled ^f	Elsewhere	15,020	15,020	14,652	0.98
Urban	Skilled ^g	Elsewhere	16,729	15,020	14,652	0.88
Outside of Polokwane	Skilled ^h	Urban	18,438	18,438	16,860	0.91
Urban	Skilled ⁱ	Foreign	36,667	36,667	26,592	0.73

Note:

a. Project wage or prevailing market wage refers to the gross wage including tax, social security payments, and fringe benefits.

b. Unskilled worker employed in informal urban labour market.

c. Unskilled worker employed in unionized urban labour market.

d. Unskilled worker employed in informal rural labour market.

e. Unskilled worker employed in unionized rural labour market.

f. Senior Site Engineer technician employed in urban area.

g. Senior Site Engineer technician employed in urban area, earning higher than market wage.

^h. Senior Site Engineer technician employed in rural area, earning market wage for region.

ⁱ. Engineer with skills that had to be sourced from abroad.

Sources: Cambridge Resources International, Inc., *Integrated Investment Appraisal: Concepts and Practice*, prepared for the Dept. of Financial and Economic Development, Limpopo Provincial Government Republic of South Africa, (March 2004), Appendix D.

3. CONCLUDING REMARKS

Labour markets in South Africa are characterized by high rates of unemployment of unskilled labour, close to full employment of skilled labour and are generally highly regulated. In such a situation the wage rate paid by a project for a particular skill or occupation can be significantly different from its economic opportunity cost. As the project wage is increased the ratio of the economic cost to the financial cost of labour will usually fall, even though the absolute value of the EOCL will tend to rise.

We find that the estimates of EOCL range all the way from being equal to the wage rate paid to being only 45 per cent of the wage rate for unskilled labour and from 0.98 to 0.73 for skilled labour. These rates are highly sensitive to the location, skill level, and to whether or not the project will be creating protected or unprotected sector employment. The supply price approach to the estimation of the economic cost of labour allows one to estimate this parameter over a wide range of different labour market settings. The purpose of this analysis is to provide an operational guide for such estimations in South Africa.

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