

A VAT Revenue Simulation Model for Tax Reform in Developing Countries

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Abstract

In this paper, we develop a model to simulate policies and revenues for a value-added taxes (VAT) system in countries that have an indirect tax system containing sales, excise taxes, and tariffs. An application of the model is carried out for Nepal, which has recently introduced the VAT to replace its sales tax system and rationalize its excise and tariff systems. The study shows that, in a developing country, tax policies that might seem very realistic and politically noncontroversial are likely to yield a very narrow tax base. If a government of a developing country wants to rely more on the VAT over time, it must move aggressively to broaden the base and enhance compliance.

Keyword: VAT, reform, revenue, model, Asia, Nepal

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1. INTRODUCTION

Import tariffs and excise taxes often constitute the most important revenue sources in developing countries. Because of growing concerns in recent years about economic efficiency and tax simplicity in a competitive and integrated world economy, many countries are lowering trade taxes and replacing distorted excise taxes with consumption-type value-added taxes (VAT). With respect to the latter, one of the most important questions is the revenue potential of alternative designs of this new tax as governments attempt to replace or enhance the level of revenues generated by their current tax system.

The potential revenue which can be raised from the VAT depends on a number of factors, such as how broad the tax base will be and the extent to which businesses will comply with the tax. This issue has not been widely discussed in the public finance literature. The main purpose of this paper is to provide an analytical framework which can be used to estimate the potential tax base and associated revenues for a VAT in a typical developing country. The model developed for this purpose should be detailed enough to facilitate the estimation of the potential revenues for alternative tax options. Such a model can then be used to assist decision makers in setting their tax policies. To illustrate, the model is applied to the economy of Nepal. We chose Nepal because it is typical of many developing countries, having very limited statistical data and moving from a highly distorted indirect tax system to a VAT.

Section 2 presents alternative approaches to the estimation of the VAT base. Section 3 describes the detailed methodology employed in this paper to estimate the tax base. Section 4 presents the application of this methodology to Nepal. We present concluding remarks in the final section.

2. ALTERNATIVE APPROACHES TO THE ESTIMATION OF A VAT BASE

The potential tax revenue of a VAT is greatly dependent on the number and level of tax rates, the scope of the tax base, and the degree of tax compliance. The proposed VAT is assumed to be a multistage consumption tax based on the destination principle, similar to a European-style VAT. The tax is applied to the sales of goods and services at all stages of the production and distribution chain. At each stage, vendors are able to claim tax credits to recover the tax they paid on their business inputs. As a result, the tax system is in effect applying the tax only to the value added by each vendor. Since the only tax that does not get refunded is the tax imposed on final consumption, the tax is equivalent to the retail sales tax on final consumption.

While imposing a tax at a destination principle, imports are taxed in the same way as domestically produced goods, and exports are not subject to tax. Therefore, the tax essentially applies to goods and services consumed domestically.¹

A common feature of the tax base in most VAT countries is to not tax a number of important goods or services because of political and socioeconomic considerations, technical difficulties, or administrative complexity. These goods and services generally fall into two major categories, zero-rated and tax exempt. For zero-rated commodities, the VAT is not levied on the selling price of these items. The vendor, however, receives full credit for the VAT paid on inputs used in production. If zero-rated sales occur at an intermediate stage, purchasers would not have a credit to deduct against any subsequent tax due. This would, in fact, provide a cash flow cost and benefit to the vendor and purchaser, respectively. The net revenue implications for the government would nevertheless be nil. By comparison, if zero-rated sales occur at the retail stage, it would effectively remove all the tax burden from consumers and the government would lose all the tax revenue from the sales of these goods and services.

For conceptual and technical difficulties, countries employing a VAT generally exempt the domestic sales of financial intermediation and insurance services.² For administrative and compliance simplicity, most VAT countries also exempt small businesses from the tax. When these goods and services are exempted, the VAT is not applied to these sales. Unlike zero-rated goods and services, vendors of exempt products are not eligible to receive any credit for the taxes paid on the inputs used to produce that good or service. The denial of input tax credits increases the production cost for the vendor, although the value added of the vendor escapes tax.

Like zero-rated sales, tax exemption can occur at either an intermediate or the retail stage. Consider the tax exemption at the retail stage where goods are sold directly to consumers. Only the value added at the retail stage will not be subject to tax. In contrast, if tax exempt sales operate at the intermediate stages of the production-distribution chain, sales by the subsequent businesses acquiring the goods are effectively overtaxed to the extent that the inputs prior the exempt stage are not creditable. As a result, the tax base is not reduced, but is augmented by the cascading effect.³ The government could ultimately collect a greater amount of tax revenue than it would otherwise.

Multiple tax rates are a common feature of some VAT systems in the developing countries.⁴ It is not uncommon to observe that a lower rate is applied to goods or services which are regarded as the necessities of life. At the same time, there are luxury goods which may be subjected to a higher rate of VAT or, alternatively, a noncreditable excise tax.

Keeping in mind the above characteristics of the VAT system, three alternative approaches can be used to estimate the tax base and associated revenues, for which input-output (I-O) tables, national

accounts and family expenditure survey data are often required. The first approach is simply to construct an aggregate tax base.⁵ It begins with the Gross Domestic Product (GDP) of the economy, which is the sum of the value added in the domestic production of all goods and services. Because we are considering a destination principle VAT, we need to subtract exports and add imports to the GDP. For a consumption type VAT, the base is also reduced by the gross capital formation of the private sector. The base is further reduced by zero-rated or exempted consumption expenditures. Since vendors of exempted goods and services are unable to claim any credits for taxes paid on the inputs acquired to produce that good or service, the tax base will have to be upward adjusted.

The second approach computes the base by summing the value added of each industrial sector in the economy. This type of calculation would provide the tax base by sector.⁶ The base has to be adjusted for the fact that the VAT is a destination type tax and, as such, would tax imports on entry into the country and zero-rate exports. Further adjustments would have to be made for changes in inventories and for commodities which are either zero-rated or exempted. Making these adjustments by sector is usually difficult since the values of exports and imports are not readily available on an industry basis. Although an aggregate adjustment for the whole economy may be possible, detailed information by sector would be lost.

The third approach is to estimate the value of goods and services purchased by consumers⁷ which would automatically capture the destination principle of the VAT since it excludes exports while imports are included. The VAT base by commodity can then be calculated using the commodity sales values at the final consumer level. The approach would also facilitate an analysis of incidence or price impact of the VAT on consumers, issues which are usually important in the political debate over sales tax reform.

3. GENERAL METHODOLOGY FOR ESTIMATING THE VAT BASE

This section explores the detailed methodology of the third approach described above. This approach depends heavily upon input-output tables. Input-output models are static in nature and, as such, do not allow for behavioral responses to policy changes. Thus, the VAT base estimation discussed in this paper does not take into account behavioral responses due to the replacement of the current sales tax system with the VAT.⁸

As was mentioned earlier, the VAT base can be estimated using the final expenditures made by various economic entities. Construction of the base can, therefore, begin with the data for domestic expenditures contained in the final demand matrix of the I-O tables. The final demand matrix generally contains a transaction matrix of a number of commodities by a number of final demand categories.⁹ The final demand categories may include many categories under each of the headings

such as personal consumption, government expenditures, investment, imports, and exports.¹⁰ Personal consumption refers to those individuals/households or entities¹¹ who acquire goods and services for their own consumption and who do not produce supplies of a commercial nature. Government expenditures include the current and capital spending by all levels of government. This would be treated in a fashion similar to personal consumption under a VAT system except that the VAT paid by the same level of government sector will not necessarily increase net government collections.¹² Investment, however, is excluded from the base calculation since the VAT allows for an input tax credit for any business purchases including capital investment. Exports are also excluded because of the destination type VAT. Imports are ignored because purchases made by other final demand categories are inclusive of imports.

The starting point in calculating the VAT base is with the amount of personal and government expenditures. This amount is equivalent to the total expenditures shown in the I-O tables. These gross expenditures represent the sum of all the expenditures on the various commodities and primary inputs contained in each category. Adjustments must however, be made for several factors in order to arrive at the VAT base. What follows is a description of the relevant deductions and adjustments.

(a) Calculation of the current sales taxes

Suppose that a country has a manufacturer sales tax system and the government proposes to replace it with a VAT. The gross expenditures contained in the I-O tables, expressed at purchasers' price, include the current sales taxes to be replaced. These taxes are imposed on the manufacturer's sale price of goods produced in the country and on the duty paid value of imported goods. Wholesale and retail trade margins are excluded from the tax base. Usually, these sales taxes apply also to a range of intermediate inputs and capital goods used in the production and distribution of goods and services.

In order to remove the current sales taxes paid directly by personal and government sectors from each category of expenditures, one has to first construct the current sales tax base. This is accomplished by removing the retail and wholesale trade margins from purchasers' expenditures on each good or service, inclusive of sales tax, according to commodity and entity.¹³ The expected current sales tax revenue from each commodity, say, the i th commodity (R_i), can be calculated by multiplying the derived tax base by the applicable tax rate and by the taxable proportion:

$$R_i = [B_i / (1 + a_i p_i)] \cdot a_i p_i, \quad (1)$$

where B_i is the sales tax-inclusive base of the i th commodity, a_i is the taxable proportion of the i th commodity, and p_i is the sales tax rate of the i th commodity. The magnitude of the taxable

proportions depends upon the proportion of the legally taxable sales to the total sales of the items contained in each commodity category.

A further calculation must be made for the hidden (or indirect) sales taxes embedded in personal and government expenditures. This represents the sales taxes which are levied on business inputs. These inputs are used in turn to produce goods and services which are ultimately sold to final consumers and governments. If sales taxes are assumed to be fully shifted forward, the taxes will be transformed into a higher price of the final goods and services.¹⁴ The I-O tables can be used to measure the indirect sales tax content in the goods and services purchased by final consumers and governments.¹⁵

The total of the above expected direct and indirect sales tax revenues over all commodities and all entities usually is not the same as the actual tax collections. This is a result of a number of factors, such as mismeasurement, bad debt allowances, tax free allowances for small importation, tax evasion, small suppliers exemption, and the inability of the tax administration to fully administer the tax system. After adjusting for the factors which are known, the expected tax revenues are made equal to the actual tax collections by applying a calculated compliance rate. This rate is simply the ratio of the actual revenue to the expected revenue. Of course, the compliance rate may vary by commodity, depending upon market conditions and other factors. In every tax system this compliance rate is usually less than one, and for many tax systems, even in developed countries, it can be substantially less than one.

(b) Introduction of the value-added tax

The potential revenue of the VAT extended to the retail level can be calculated by summing domestic personal and government expenditures at retail prices. This does not include expenditures made by businesses since the taxes paid on business purchases are creditable.

Thus, the starting point for calculating the VAT base is with the value of all goods and services (shown in the I-O tables) purchased by personal and government sectors, net of all current sales taxes.

This is the total potential tax base, which is then multiplied by the taxable proportions for each corresponding commodity in order to arrive at the VAT base. At this point, the taxable proportions are determined by the tax policies and laws under consideration. For example, the proposed VAT may zero-rate or exempt certain goods or services. In such cases, the full value of zero-rated or exempted goods and services purchased by individuals or governments has to be removed from the potential base. For exempt items, however, taxes paid on business inputs used to produce the exempt goods or services are not creditable. Therefore, an additional adjustment to the tax base is needed to account for the extent to which the vendors cannot claim input tax credit for taxes paid on business expenditures.¹⁶ In summary, the total potential VAT base can be expressed as follows:

$$TB^{vat} = \sum_i [B_i / (1 + \alpha_i \rho_i)] \cdot [1 + \varphi_i^w] \cdot [1 + \varphi_i^r] + \sum_j \omega_j K_j, \quad (2)$$

where φ_i^w is the percentage wholesale margin for the i th commodity, φ_i^r is the percentage retail margin for the i th commodity, K_j is the total business inputs used in the production of the j th exempt sector under the proposed VAT, ω_j is the ratio of taxable inputs to the total inputs used in the production of the j th exempt sector under the proposed VAT, and B_i , α_i , and ρ_i are defined as eqn. (1).

Special attention should be paid to long-term residential rent paid by tenants to landlords and imputed rent arising from the consumption flow by owner-occupied housing, which is normally presented as part of personal expenditures in the I-O tables or national accounts. This rent is often tax exempt and should be excluded from the tax base in order to avoid double taxation, since as an alternative, the VAT is sometimes levied on the purchase price of newly constructed dwellings.¹⁷ A portion of gross cash rent and imputed rent, however, would still be subject to VAT as a result of taxable expenditures made for repairs, property insurance, and certain utilities. It should be noted that the value of land is excluded in both the I-O tables and national accounts because it does not represent value added. For our purpose, the value of land is usually included as part of the purchase price of a new home. Thus, when new houses are taxable under the VAT, the personal expenditures must be adjusted upward to account for the full price of new homes. Some adjustments must be also made to gross expenditures in the government sector. For the most part, the production from this sector is usually exempt under a VAT and the associated value added would not attract the tax. On the other hand, the intermediate inputs used to produce government goods and services are usually taxable and, as a consequence, remain in the tax base of the government sector.

Finally, to arrive at a benchmark estimate of revenue yield, the tax base for each commodity item is then multiplied by the compliance ratio under the current sales tax system. This adjustment implies that the compliance rate for each commodity under the proposed VAT would not be different from that being subject to the current system. The compliance rate may be adjusted upward however if one believes that the VAT system would enhance taxpayer compliance, or if the government can increase the level of administrative enforcement. On the contrary, the compliance rate may be adjusted downward if tax evasion is expected to spread with the introduction of a VAT.¹⁸ The total expected VAT revenues for the economy will then be equal to the summation of all adjusted tax bases across goods and services purchased by both the personal and government sectors, times the proposed VAT rates.¹⁹

(c) Accrual versus actual revenue collections

The model developed so far provides an annual estimate of the VAT paid by final consumers and governments. These estimates are presented on an accrual basis rather than the actual revenues

received by the government due to the payment lags built into the VAT system. For example, the VAT may be designed to provide a great deal of flexibility in filing requirements, depending on the size of the business. For farms, filing may be required on a monthly basis. For smaller farms, filing may be allowed on a quarterly or annual return. Certain types of businesses such as exporters are likely to choose to file their returns on a monthly basis in order to claim input tax credits earlier. Furthermore, all taxpayers are likely to have until the end of the month following the reporting period to file their returns.

From a government's perspective, it is necessary to transform the VAT estimates from an accrual to a collection basis. One can first segregate the above annual estimate of the VAT base into the individual value-added components for primary producers, manufacturers, wholesalers, retailers, and other service sectors. Each of these components is then converted to a monthly basis using sales and other relevant data. For example, the retail component is distributed to each month based on monthly retail sales data. This should reflect the seasonal patterns in production and distribution channels. The appropriate collection lags should also be incorporated for each type of tax filer.²⁰ The resulting revenues can then be transformed to a collection basis. This consideration will be particularly important when the VAT is first introduced into a country.

4. AN APPLICATION TO A CASE FOR NEPAL

The current sales tax collected in Nepal in fiscal year (FY) 1994-95 was about 6,032 million rupees which accounts for approximately one-third of the total tax revenues.²¹ It is the single most important revenue source. Like many other countries, the sales tax is imposed on the manufacturer's sale price of goods produced for domestic consumption, and on the duty paid value of imported goods. As a result, the tax applies to a range of intermediate inputs and capital goods used in the production and distribution channels. This tax has become not only administratively complex, but also economically inefficient.²² The Minister of State for Finance in Nepal announced in the July 1993 budget that the government would focus on gradually transforming the sales tax into a value-added tax.²³ Since then, subsequent governments have had to make a series of tax policies and set tax rates in order to ensure the new sales tax system is fair, simple, efficient and produces revenue in a stable fashion.

In the July 1993 budget, it was announced that the number of sales tax rates would be reduced from five to two rates, 10) and 20).²⁴ The same tax rates are applied equally to domestically produced goods and to imports in order to streamline the sales tax operation. In addition, there has been a substantial amount of government revenues collected from a number of selective excises on cigarettes, liquor, beer, soft drinks, edible oils, cement, textiles, television sets, and VCRs. The revenue was estimated to be about 1,655 million rupees in FY 1994-95. The excise tax system is fairly complex due not only to the number of products subject to different tax rates, but also because of specific exemptions and the different ways the tax is levied.

The main objective of this section is to apply the above model to the estimation of potential revenues for a VAT to be implemented in Nepal.

(a) Preparation of the basic data

The data are quite limited in Nepal. For example, the 1987 I-O tables constructed by the United Nations Development Program are from the latest year available.²⁵ In order to present the most up-to-date economic structure for the country, we developed a complete set of data for the FY 1994-95 since this is the latest year that data are available on the expenditure side from national accounts in Nepal.²⁶ For internal consistency, national accounts are used as the core data when reconciliation is needed.

The data are arranged into three major categories-personal, business, and government. First, the detailed personal expenditure data are only available from a Household Budget Survey for 1985.²⁷ These data also are separated into urban and rural for each class of commodity expenditure. Due to their different expenditure patterns and the recent massive migration from rural to urban areas, the current detailed household expenditures by commodities for the country as a whole are constructed by increasing the proportion of the total national household expenditures made in urban areas from 7) in 1985 to 12) in 1994. Using the FY 1994-95 aggregate private consumption shown in national accounts as a control total, the detailed personal expenditures by commodities are estimated.

Second, the information concerning business expenditures on capital investment and intermediate inputs is very limited. The national accounts only provide an aggregate figure on private capital formation which can be further separated into machinery and equipment and construction. Using import information, the totals for machinery and equipment are further allocated among tractors, motor vehicles and parts, aircraft, telecommunications, medical equipment, and other machinery equipment.²⁸ This is done in anticipation that certain goods and/or sectors are likely to be either zero-rated or exempted under the proposed VAT. The split between residential and nonresidential construction is also important because of their differences in the composition of mixed construction materials. For nonresidential construction, about one-third is sponsored by international organizations and is classified as expenditures of the government sector. For each construction category, detailed requirements of construction materials (e.g., cement, brick, sand, steel, and wood), labor cost, as well as profits and contract tax are provided by the Nepal Engineers' Association.²⁹

In addition, the detailed intermediate inputs demanded by each of the industrial sectors are developed using the 1987 I-O tables. These inputs are first identified as taxable or exempt under the proposed VAT system and are then projected to FY 1994/95.³⁰

Third, government expenditures are separated into Regular and Development Expenditures. The latter are mostly funded by international organizations such as the World Bank, the Asian Development Bank, and bilateral donors which do not pay tariffs or other commodity taxes on their purchases. Each of the Regular and Development Expenditures can be further broken down into current and capital expenditures by commodity items or economic functions.³¹

After the basic detailed expenditures data for FY 1994-95 are constructed, the wholesale and retail margins for each commodity are removed from purchasers' expenditures on each good or service derived above.³² This would form the manufacturers' or importers' sales totals, inclusive of taxes, by commodity and by entity. The expected sales tax revenue for each commodity can then be calculated based on eqn. (1).

The sum of the above potential sales tax revenues for all commodities and all entities is greater than the actual tax collections, due to such factors as tax evasion and weak tax administration. The overall compliance rate can be estimated by the ratio of actual tax collections to expected revenues. The compliance rate is approximately 80) for alcoholic beverages, 90) for tobacco products, and 58.6) for the remaining commodities under the current sales tax system.

(b) Simulation of the VAT revenues

The proposed VAT will be imposed on goods and services consumed in the Kingdom of Nepal except for those specified in Schedules 1 and 2 of the VAT Act.³³ The VAT Act will replace the Sales Tax Act, Hotel Act, Contract Tax Act, and Entertainment Act. This implies that, for revenue-neutral, at least a total of 6,857 million rupees should have been generated in FY 1994-95 if the proposed VAT was implemented.³⁴

The following basic tax policies are incorporated in the model simulations for illustrative purposes:

- (i) impose a single rate of VAT which is extended to the retail level under the destination principle. Most personal and government expenditures are taxed, including government expenditures financed through international organizations.
- (ii) zero-rate exported goods and services.³⁵
- (iii) exempt unprocessed food, drug and medical services, books and newspapers, water and transportation services.
- (iv) exempt newly constructed dwellings, residential rents, and financial services.³⁶
- (v) adjust the excise levies on alcoholic beverages and tobacco products to maintain their current consumer prices.

Before turning to the empirical results, it is useful to recall the equivalency of the VAT to

that of retail sales tax levied on the final selling price of all goods and services. The data on the latter were derived earlier in the form of gross expenditures by commodities under the personal, business, and government category. These gross expenditures represent the sum of all the expenditures on the various commodities and primary inputs contained in each category.

Adjustments must be made for factors such as removal of the current sales taxes, zero-rated and exempt goods and services, and realistic tax compliance by taxpayers in order to arrive at the VAT base and the associated revenues.

First, the above gross expenditures by commodities and by entities contain the amounts of the current sales taxes, directly paid by individuals and by governments, which must be deducted in calculating the VAT base. Since sales taxes are assumed to be fully shifted forward to final consumers, a further deduction must be made for the indirect sales taxes embedded in the price of personal and government expenditures. One can observe from Columns (2) and (3) of Table 1 that more than half of the current sales taxes are imposed on intermediate inputs and capital goods in Nepal. These input taxes are now embodied in the form of higher prices of goods and services sold to final consumers and governments.

Second, the excise tax on alcoholic beverages and tobacco products are adjusted upward in order to maintain the same level of retail prices for consumers. The excise adjustment (11£) must equal the difference between the manufacturers' sales prices of the excisable good (including excises but excluding sales taxes) under the new versus the current sales tax systems. That is,

$$\Delta E_i = B_i / (1 + \rho^v \phi^v) - B_i / (1 + \rho_i \phi), \quad (3)$$

where ρ^v is the single VAT rate, ϕ^v is the VAT compliance rate, ρ_i is the current sales tax rate of the i th excisable good, and ϕ is the compliance rate of the current sales tax systems. B_i is defined as eqn. (1), namely, the current sales tax-inclusive base of the i th excisable good.

Hence, the adjustments shown in Column (5) of Table 1 refer to the case if the VAT rate is set at 12) and the tax compliance remains the same as the current tax system.³⁷

Third, the full value of zero-rated goods or services purchased by final consumers and governments must be removed from gross expenditures. The simulation will only apply to exports, not to the goods and services paid for with foreign exchange but consumed domestically. Fourth, for exempt goods and services that operate at the retail stage, the VAT is not levied on their selling prices nor are

vendors entitled to the input tax credit. As a result, the associated input taxes that are not creditable form part of the VAT base. It should be noted that while not only unprocessed basic groceries but also basic agricultural inputs such as fertilizer, seeds and pesticides are exempt, the agricultural sector is for practical purposes largely zero-rated with the exception tractors and other agricultural equipment. Another interesting case in Nepal is the practical difficulty of imposing a VAT on newly constructed houses because no such market prevails. New houses are normally self-constructed with assistance from relatives or friends. Therefore, new houses are treated as tax exempt and the purchases of construction materials are made subject to tax.

The business inputs associated with the denied input tax credits are all shown by sector in the second panel of Table 1 to form part of the VAT in Nepal.

Table 1. The VAT base for the FY 1994-95 in Nepal (millions of rupees)

Expenditure categories	Gross expend (1)	Current sales tax			Adjusted excise ^a (5)	Other deduc- tions (6)	VAT base (7) ^b
		Direct (2)	Indirect (3)	Total (4)			
<i>Personal expenditures</i>							
Food and non-alcoholic beverages	92,301	444	1,392	1,836	0	85,349	5,116
Alcoholic beverages	1,988	241	26	267	143	413	1,451
Tobacco products	3,821	515	50	565	238	391	3,103
Clothing and footwear	18,298	695	266	961	0	7,529	9,808
House imputed and paid rents	13,457	0	204	204	0	13,253	0
Newly constructed housing	8,099	0	418	418	0	5,364	2,317
Household goods	16,128	250	241	491	0	11,503	4,134
Transport and communication	2,192	13	33	46	0	1,907	239
Drugs and medical care	4,391	7	66	73	0	3,805	513
Personal care	1,848	81	26	107	0	764	977
Education, reading, and recreation	4,927	27	74	101	0	4,035	791
Restaurants	4,045	0	61	61	0	1,613	2,371
Others	10,997	0	167	167	0	10,830	0
<i>Business expenditures acquired by^c</i>							
Agriculture	19,216					17,511	1,705
Transportation	16,052					11,834	4,218
Water	1,673					1,461	212
Medicine/pharmaceuticals	1,118					697	421
Non-residential construction	15,042					10,660	4,382
Financial institutions	4,291					3,093	1,198
<i>Government expenditures</i>							
Regular expenditures	10,605	36	164	200	0	9,710	695
Development expenditures	19,237	19	514	533	0	16,365	2,339
Total	269,726	2,328	3,702	6,030	381	218,087	45,990

^a The adjustments are based on a 12% VAT rate.

^b Column (7) = Column (1) – Column (4) + Column (5) – Column(6).

^c These figures refer to the expenditures incurred by sectors which produce exempt goods and services under the VAT law.

Fifth, the government is treated in the same fashion as final consumers. In other words, expenditures incurred by the government are taxed.

Each of these tax policy measures presented in the VAT Act might appear reasonable and politically prudent, in the context of the economy of Nepal. But the results in Column (7) of

Table 1 show that the VAT base, with the current tax compliance, has been reduced to approximately 20% gross domestic expenditure. It is also unrealistic to expect a substantial increase in compliance of the tax in a near term. If significant additional revenues are to be collected, tougher tax policies to broaden the tax base will have to be implemented. Because the share of the formal economy is relatively small in such a developing country, the potential tax base for a VAT is rather narrow. Hence, substantial political will is needed in developing countries to impose taxes on goods and services that might be exempted due to political or social considerations in developed countries.

The introduction of the VAT in Sri Lanka has faced a similar obstacle where the effective tax base, taking into consideration both policy coverage and compliance effectiveness is less than 35% of gross national expenditures.³⁸

A VAT generally requires a higher level of administrative expenditures than a single stage sales tax system because of the greater number of taxpayers and the initial start up costs. This will reduce the net collection of tax revenues.³⁹

There is a question of whether the VAT would lead to either greater tax enforcement or greater revenue leakage. One can argue that invoices issued by vendor registrants are proof of tax paid and, thus, constitute the basis for input tax credit claims by purchaser registrants. The invoice system may be considered by some economists or tax practitioners as a mechanism that provides an audit trail and an incentive to record transactions and comply with the tax, thereby reducing the likelihood of tax evasion and the amount of tax evaded. On the other hand, one can also argue that the VAT would lead to a substantial revenue leakage associated with things such as tax evasion, tax free allowances for various small importations, and revenues lost from a broader exemption of small traders. There is no incentive to comply in the case of sales by retailers to consumers who are not registrants and cannot claim input tax credits. Moreover, there is an incentive for retailers to evade the tax, thereby reducing the overall price in order to secure a sale. The incentive can be expected to be even stronger for service transactions where value-added at the final stage normally constitutes a large proportion of the final price. Such transactions may further provide the basis for additional evasion of income tax by vendors.

In effect, this is an empirical question, and the answer will vary according to the circumstances of the specific country. Assuming that the current sales tax compliance ratio continues to prevail in Nepal, Table 2 suggests that the government would need a VAT rate as high as 15% in order to raise at least as much government revenue as the total of the current sales tax, hotel tax, contract tax and

entertainment tax. One may also observe that the upward adjustment to excise taxes in alcoholic beverages and tobacco products declines as either the VAT rate or the tax compliance increases.

If the government can increase the rate of taxpayer compliance, one could expect more sales and other tax revenues. For example, the simulation results show that if the tax compliance increases by five percentage points for the VAT in Nepal, the proposed VAT at 13.5) rate would be able to collect more revenues than the current sales tax system (see Table 2). With a 14) VAT rate, the government could further eliminate miscellaneous excise taxes of approximately 113 million rupees from commodities other than alcoholic beverages, tobacco products, and cement.

5. CONCLUDING REMARKS

In this paper, a simulation model has been developed to estimate the VAT base and revenue potential for alternative policy options to replace the current sales tax, hotel tax, contract tax and entertainment tax. The model is fairly detailed and can be employed to assess the consequences of key policy decisions regarding the treatment of major commodities and sectors. It can also be extended further to examine the relative price effects and tax incidence of sales tax reform.

The model is applied to the case of Nepal where statistical data are not available in a consistent fashion or a published form. Hence, efforts had to be made to collect expenditure data by commodities and by category of consumer from a number of secondary sources. This information was then organized in such a

Table 2. *Estimates of potential sales tax revenues for the FY 1994–95 in Nepal by VAT rates and by compliance ratios (millions of rupees)*

VAT rates (%)	Current compliance rate			Increase compliance by one percentage Pt.			Increase compliance by five percentage Pt.			Increase compliance by ten percentage Pt.		
	VAT	Excise	Total	VAT	Excise	Total	VAT	Excise	Total	VAT	Excise	Total
10	4,457	456	4,913	4,531	451	4,982	4,823	434	5,257	5,188	412	5,600
11	4,899	418	5,317	4,979	413	5,392	5,301	394	5,695	5,702	370	6,072
12	5,340	380	5,720	5,428	375	5,803	5,778	354	6,132	6,215	329	6,544
13	5,781	343	6,124	5,875	338	6,213	6,254	316	6,570	6,727	289	7,016
14	6,220	307	6,527	6,322	301	6,623	6,730	278	7,008	7,238	249	7,487
15	6,660	271	6,931	6,769	265	7,034	7,205	240	7,445	7,749	210	7,959
16	7,098	236	7,334	7,214	229	7,443	7,679	204	7,883	8,259	172	8,431
17	7,536	201	7,737	7,659	194	7,853	8,153	168	8,321	8,769	134	8,903
18	7,973	167	8,140	8,104	160	8,264	8,626	132	8,758	9,277	97	9,374
19	8,410	133	8,543	8,548	126	8,674	9,098	97	9,195	9,785	61	9,840
20	8,846	100	8,946	8,991	93	9,084	9,570	62	9,632	10,293	25	10,318

way as to facilitate the estimates of the tax base and the associated revenues.

The preliminary results show that there is a significant amount of the current sales taxes imposed on business inputs in Nepal, but the general compliance rate of the current sales tax still is only about 58.6). With a small increase in effort on tax enforcement, a 14) rate of VAT extended to the retail

level could replace the current sales tax, hotel tax, contract tax and entertainment tax revenue as well as miscellaneous excise taxes for commodities other than alcoholic beverages, tobacco products, and cement. This type of analysis for the revenue estimation of a VAT system clearly indicates the areas where the potential for revenue generation through base broadening is greatest, and also points to the areas where special attention must be made to enhance compliance.

These two aspects of the design and operation of a VAT are particularly critical in a low-income country because of the large proportion of expenditures on which no tax system can be effectively applied. The small size of the modern sector where such taxes can be administered needs to be taxed in the least distortionary fashion as the modern sector is usually already taxed relatively heavily as compared to other parts of the economy.

Efforts to improve compliance require a measurement of the compliance rate and its movement monitored over time. The use of a tax calculator model as outlined above will greatly facilitate the estimation of the revenue impacts of such changes in compliance. Compliance, however, will come about only if the tax laws are designed to reduce the incentive for evasion and if the tax administration is strengthened to provide both service and enforcement.

NOTE

1. This is equivalent to the tax base of a pure retail sales tax which refers to a sales tax being levied on goods only sold to final consumers. Most retail sales tax systems also apply to goods sold to other businesses, thereby leading to cascading. For example, Canadian provincial retail sales taxes on business inputs account for approximately one-third of the total sales tax collections. See, e.g., Kuo, McGirr and Poddar (1988).
2. New Zealand and Singapore are the only countries which tax the underwriting activity of general insurance. Nevertheless, the insurer's investment income is still not included in the tax base. See, e.g., Poddar and English (1997), Schenk (1994) and van Brederode (1995).
3. This is based on the assumption that competition from foreign suppliers would not prevent the domestic producers from increasing their prices. The actual situation will greatly depend upon market situations.
4. See, e.g., Shoup (1986).
5. See, e.g., Zee and Bodin (1992).
6. See, e.g., Aguirre and Shome (1988).
7. This approach employs the equivalence of a value-added tax base to a retail sales tax levied on the final selling price of all goods and services. See, e.g., Department of the Treasury (1984), Kuo (1991).

8. The behavior response to changes in taxes can be incorporated in the calculation of the tax base if the appropriate own and cross demand elasticities of goods and services can be obtained.
9. For example, this matrix contains 627 commodities and 136 categories in the Canadian I-O tables. Of the 627 commodities, seven are primary inputs which represent value-added in the form of wages and salaries, supplementary labor income, net income of unincorporated businesses, and other operating surplus. A detailed description can be found in Statistics Canada (1987).
10. Imports are shown as part of the final demand matrix in the Canadian I-O tables. For other countries, it may be displayed as part of use (or input) matrix. See, e.g., Cuentas Nacionales de Mexico (1994).
11. It includes purchases made by individuals and non-profit organizations. The latter generally comprises labor unions, fraternal societies, community groups, churches, and other charitable organizations.
12. There may be more than one level of government in certain countries. If this is the case, the net VAT collections will not include the VAT paid on goods and services by the same level of the government that imposes the VAT.
13. These expenditures are sometimes further separated for the sales by manufacturers and importers. This is necessary because differential tax rates are applied to domestic and imported goods. For example, imports are taxed differently from domestically produced goods in Puerto Rico and Sri Lanka. Although the general sales tax rate is 5) in Puerto Rico, the effective rate is 6.6) for imports and 3.6) for sales of domestic goods. In Sri Lanka, since 1993 the tax base for imports was uplifted by 25) from the c.i.f. price and customs duty.
14. In 1991, the Canadian experience of replacing the manufacturers' sales tax with the VAT suggested that the sales tax was fully forward shifted. See GST Consumer Information Office (1991). If the fully forward shifted assumption is not made, the sales and excise taxes levied on business inputs may be shifted backward onto production factors, labor or capital.
15. A detailed methodology of using the I-O tables can be found in Kuo et al. (1988).
16. See, e.g., MacKenzie (1992).
17. The expenditures on new houses are normally shown under business investment rather than personal expenditure categories contained in the I-O tables or national accounts.
18. See, e.g., Spiro (1993) and Drummond, Ethier, Fougere, Girard, and Rudin (1994).
19. The compliance rate will also reflect the degree to which the tax base has been reduced by the definition of the small business exemption allowed under the VAT. A small business exemption almost always exists under the prior indirect tax system, hence, one must estimate the degree to which this exemption under the VAT is smaller or bigger.
20. The usual expectation is that the VAT collected exceeds the VAT paid on inputs, and the taxpayer remits the difference each month or quarter. It can also be the case, however, that the VAT paid on inputs is greater than the VAT collected from sales, and the taxpayer would file for a refund. Examples may include taxpayers who produce dominantly export-oriented or zero-rated commodities, as well as those who in a period make a major capital acquisition. It can be further complicated in a

situation where a cyclical relationship exists between the purchase of business inputs and the sale of goods or services.

21. Minister of Finance (1996a,b).

22. See, e.g., Sunley, Chu, Bristow and Muller (1993) and Crawford, Jenkins, and MacNevin (1993).

23. Minister of Finance (1993).

24. Prior to July 1993, there were five different sales tax rates, ranging from 5) to 40), on selected goods and services.

25. Shrestha (1992).

26. Central Bureau of Statistics (1996).

27. Nepal Bastra Bank (1994). Although the 1987 I-O tables provided the more recent data, they were constructed and presented in the final demand according to the industry rather than the commodity category.

28. These data are obtained mainly from import statistics. Most machinery and equipment are imported from India. See Federation of Nepalese Chambers of Commerce and Industry (1996).

29. For example, the percentage distribution of the expenditures on residential construction is estimated at 11) for cement, 12) for brick, 14) for steel, 18) for wood, 2) for sand, 19) for labor, 5) for contract tax, and 14) for profits.

30. The 1987 intermediate inputs demanded by businesses were obtained from the 1987 I-O Tables constructed by the United Nations Development Program. These were available for a 39-industry by 39-industry matrix. We first grouped them in such a way that nine industries, consistent with industry categories published in National Accounts, required intermediate goods and services produced by 39 industries. These intermediate inputs were then projected up to 1994/95 by the corresponding industry growth rates from 1987, published by Central Bureau of Statistics (1996).

31. These data were made available to us based on the budget estimates or the actual spending from the Ministry of Finance.

32. The sources of trade margins are obtained from discussions with the government officials and trade associations.

33. Ministry of Finance (1996a, b). Schedules 1 and 2 of the VAT Act describe goods or services to be exempted and zero-rated, respectively.

34. The 6,857 million rupees consists of 6,032 million rupees for the sales tax, 229 million rupees for the hotel tax, and 505 million rupees for the contract tax and 91 million rupees for the entertainment tax.

35. Goods and services supplied for the payment of convertible foreign currency are all taxable so long as they are purchased and consumed domestically.

36. See, e.g., Conrad (1990).

37. The new excise taxes are influenced by VAT rates and tax compliance. The higher the VAT rate and the tax compliance, the lower upward adjustments in excises are required to keep gross-of-tax expenditures to consumers unchanged after sales tax reform.

38. Sri Lanka introduced its VAT in April 1998. Romania is another country which has a low VAT base at approximately 30% of GDP.

39. The administrative cost of operating the single stage sales tax was 19.5 million rupees for FY 1996-97 in Nepal. When the VAT was introduced in November 1997, the administrative cost of implementing the tax amounted to an estimate of 38.7 million rupees in FY 1998-99. This represents about 0.5% of expected annual revenues, which is still too small a budget for the operation of an effective tax administration.

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