Modelling value-added tax in the presence of multi-production and differentiated exemptions

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A R T I C L E   I N F O

A B S T R A C T

We develop a framework for economy-wide modelling of value-added tax systems. Our framework models a number of complexities of VAT systems as implemented by tax agencies. In particular, we model multiple rates, multiple exemptions, multiple degrees of refundability across commodity users, and multi-product enterprises. We use our framework to model what is arguably South East Asia's most complex VAT system: that of Vietnam. We analyse the macroeconomic, industrial and distributional effects of simplifying Vietnam's complex VAT system. We simplify the system via a budget-neutral movement to one rate and removal of discretionary exemptions. This generates an aggregate welfare gain, but adverse distributional effects. Adverse distributional effects can be greatly ameliorated, at small cost to the aggregate welfare gain, via exclusion of paddy and rice from the VAT simplification program.

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1. Introduction

Since the 1960s, value-added tax (VAT) systems have been progressively adopted around the world[1]. The majority of VAT regimes are characterised by a consumption tax base with multiple tax rates, multiple exemptions, and the credit method of tax liability calculation[2]. These VAT characteristics have been incorporated in a number of studies on the incidence and economic effects of VAT. However, three important VAT characteristics have yet to be formalised in applied VAT research: multi-production, legislated differences in exemption status, and industry-specific differences in the refundability of VAT paid on inputs to production and investment. The need for careful and detailed treatment of these VAT characteristics is particularly important in disaggregated general equilibrium models. These models are recognised as well suited to analysis of the efficiency effects of tax policies[3]. The modelling of VAT within a general equilibrium framework raises a fourth issue not yet addressed in the VAT modelling literature. Even in highly disaggregated models, commodity and industrial definitions are, by necessity, aggregates of hundreds of commodities and industries, each with the possibility of distinct tax rates and exemptions under the relevant VAT statutes. Previous studies have assumed that a commodity is either exempt or taxed. In this paper we provide a comprehensive method for modelling VAT in a detailed economy-wide setting. Our method addresses the four aforementioned VAT features. We apply our technique to Vietnam. The Vietnamese VAT system is arguably among the most complex in South

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[1] By mid-2006 there were around 140 countries with a VAT (Bird & Gendron, 2007).
[2] For comprehensive reviews of VAT systems, see Bird & Gendron (2007), Ebrill et al. (2001) and Cnossen (1998).
[3] See for example Fullerton, Henderson, and Shoven (1984), McLure (1990, p.38), and Fehr, Rosenberg, and Wiegard (1995), pp. 39–40.

East Asia. Six countries in the region have a VAT[4]. Of these, only Vietnam's VAT system has more than one rate[5]. Vietnam's system is characterised by many non-standard exemptions[6]. It has been used as an instrument of short-run macro-policy, via temporary changes to commodity-specific VAT rates[7]. With its many rates and exemptions, the Vietnam implementation exercises every aspect of our VAT theory, both in database construction and model simulation.

In recent years, the Vietnamese indirect tax system has been simplified. Nevertheless, a wide range of tax rates and exemptions remain. Prior to 1999 a Turnover Tax, levied at rates ranging from 0.5 to 40 per cent, was levied on gross sales revenue. Criticised for its cascading effects, the Turnover Tax was replaced by a VAT in January 1999. The VAT was initially levied at three rates: 5, 10 and 20 per cent. Since January 2004, the number of VAT rates was reduced to two: 5 and 10 per cent. In general, the 5 per cent rate attaches to unprocessed agricultural commodities at the commercial trading stage, certain primary building materials, chemicals, fertilisers, pharmaceuticals, certain machinery, metal products, animal feed, publishing, water, road transport, rail transport, air transport, scientific services, and cultural services. All other commodities are taxed at 10 per cent. Sales of mining to export are explicitly declared VAT exempt, despite the zero rate applying to export sales. A number of VAT exemptions are made for goods and services deemed either essential or important for economic development. These include raw agricultural materials, imported equipment used in R&D and investment, health and education services, public broadcasting, cultural events and sanitation works.

The literature on indirect taxation recognises that a complex VAT system, characterised by multiple rates and exemptions, imposes two economic costs. First, it creates allocative efficiency losses, via distortion of relative prices[8]. Second, it creates technical efficiency losses, because complexity adds to the VAT compliance and enforcement burden[9]. The presence of these costs suggests that welfare gains are available from a revenue-neutral simplification of the present system. We investigate the size of the first of these gains (lower allocative efficiency losses) for Vietnam from a move to a single VAT rate that is revenue neutral in the presence of simultaneous removal of discretionary exemptions. We do this with a dynamic CGE model of Vietnam that contains explicit modelling of the complexity of Vietnam's VAT system. We find that a feature of Vietnam's present VAT system is taxation of investment. This is reduced via equalisation of VAT rates and removal of policy exemptions, promoting capital accumulation. This is an important source of potential gain for Vietnam. However, we find that general rate equalisation and exemption removal has adverse distributional consequences. These can be mitigated, for a small loss to the aggregate welfare gain, by excluding two products – paddy and rice – from an otherwise general policy of rate equalisation and exemption removal.

The remainder of the paper is structured as follows. In Section 2 we present a general framework for modelling value-added tax in the presence of multi-production, differentiated rates and differentiated exemptions. We implement this method for Vietnam, integrating our VAT modelling framework within a large-scale dynamic general equilibrium model. Section 3 provides an overview of this model, VIPAG[10]. Section 4 describes simulation settings. Section 5 discusses results and Section 6 concludes the paper.

2. A general framework for vat modelling

The ideal VAT regime, imposing the least distortions and compliance costs, is that with a single rate on domestic sales, a zero-rate on exports, and no exemptions (see Tait, 1988; Ebrill, Keen, Bodin, & Summers, 2001). Under the ideal VAT regime, the VAT is equivalent to a consumption tax: producers pay VAT on their outputs, but fully reclaim VAT paid on their inputs. Effective tax rates on producers are thus zero. Effective tax rates on final consumers are the same as legislated tax rates. This is the type of VAT modelled in early general equilibrium studies (see, for example Ballard, Scholz, & Shoven, 1987a; Ballard & Shoven, 1987; Kehoe, Manreas, Noyolo, Polo, & Sancho, 1988).

In practice, VAT systems contain exemptions. Exemptions are often granted to basic goods (such as certain foods, medicines, education and healthcare services) and hard-to-tax services (such as housing, finance and insurance). Extensive discussions on these issues and their effects on the economy can be found in Tait (1988) and Ebrill et al. (2001). Producers of exempted goods do not charge VAT on their outputs, but they cannot obtain credits for VAT paid on their inputs. These input taxes are passed on to users of the exempt commodity, irrespective of whether they are a final user or another producer. This creates tax cascading effects, with positive effective VAT rates faced by all producers using the exempt goods. This problem is well-recognised in the VAT literature. It was first explored analytically in Gottfried & Wiegard (1991), who assume that exemptions apply to all users. Later VAT researchers have adopted their method (Marks, 2005; Toh & Lin, 2005).

There are other well-known features of implemented VAT systems that do not yet appear in the formal VAT modelling literature. Our VAT modelling method addresses these features. First, many firms produce multiple commodities. Firms producing both taxable and exempt goods can reclaim only taxes paid on inputs to production of taxable goods. Second,

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[4] Cambodia, Indonesia, the Philippines, Singapore, Thailand and Vietnam.

[5] See Bird & Gendron (2007), pp. 223–227. Like Bird and Gendron, we do not count zero rating of exports as an additional VAT rate.

[6] These include unprocessed foodstuffs, imported capital goods, sports and culture, public transport, and certain government purchases (Ebrill et al., 2001, p. 84).

[7] As part of its fiscal stimulus package, in January 2009 the Vietnamese government halved 2009 VAT rates on coal, basic chemicals, automobiles and parts, metals, concrete products, transport, hotels and tourism services, and printing products (Giesecke & Tran, 2009b).

[8] See for example Tait (1988) and Ebrill et al. (2001).

[9] See for example United States Government Accountability Office (2008).

[10] The Vietnam Policy Advisory Group (VIPAG) model was developed for the Vietnam Ministry of Finance by Centre of Policy Studies, Monash University, under UNDP-funded project VIE/03/010.