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Are price controls necessarily bad? The case of rice in Vietnam

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Abstract

Most economists' instinctive reaction to price controls is that they are harmful. Its strong enforcement results in shortages and resource misallocation, while weak enforcement often leads to black markets and high transaction costs. Given these instincts, this paper assesses the pros and cons of rice price controls in Vietnam using a multi-sector multi-household general equilibrium model. These price controls fix producer prices and allow government marketing agencies to sell at higher prices and hence are, in part, a revenue raising device. As such, they may be part of an efficient tax mix, particularly so since agricultural incomes and production go untaxed under the formal tax system. It is argued that such controls can act to dampen costly domestic adjustments in the face of volatile world prices. It is shown that this system can be supported as welfare enhancing under conditions currently prevailing in Vietnam.

JEL classification: D2; D4; D5; D6; H2; H3
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1. Introduction

Through the decade of the 1990s, it became progressively less fashionable to work on price controls. Most countries with controls were liberalizing, and it anyway

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seemed clear that the impacts of price controls were negative, and entailed significant efficiency costs. These reflected tax like resource misallocations due to controlled prices on goods or inputs, inefficient allocation of price-controlled goods through queuing or other rationing devices, and time and other resource costs lost in executing rationing schemes. Few redeeming words can be found in the literature in favour of price controls.[1]

Here we again take up the issue of whether price controls are necessarily bad, and focus on rice price controls in Vietnam. Vietnamese rice price control mechanisms over the years have not been that dissimilar to those used in other Asian rice producing countries, involving a monopoly marketing agency who buys from farmers at agency set prices, and resells to consumers. Some form of supporting foreign trade intervention (export quotas) is typically needed as an accompaniment.

We highlight two implications of this form of price control that can rationalise their use from a national welfare point of view. The first are public finance considerations, since with controlled producer prices set below consumer prices (or world prices for export sales) buying and reselling raises revenue for the government per unit transacted. In a low income economy with a large agricultural sector where the sets of feasible policy interventions are limited, if the agricultural sector is effectively non-taxable for either administrative or political reasons, then rice price controls can serve to broaden the tax base beyond taxable manufactures and yield lower effective tax rates to the combined revenue system.[2] If an optimal policy-mix of manufacturing level taxes and price controls were to be designed, including rice price controls may well make sense.

The second are adjustment costs. If stochastic external shocks hit the economy, under myopic behaviour these will generate behavioural responses, which have adjustment costs (as labour and land move between crops in the event of rice price changes, for instance).[3] A price control regime can have the effect of insulating domestic markets from external fluctuations and reducing (or in the limit eliminating) transactions costs. These two features of price controls may more than compensate for their traditional price distorting costs.

We evaluate how these two features of rice price controls compare against their more traditional price distorting effects using a multi-sector multi-household general equilibrium model of Vietnam calibrated to 1995 data.[4] The price control regime assumed for rice is

[1] For recent literature on rice price controls, see David and Huang (1996), Dawe (2001), and Jha and Srinivasan (1999).

[2] The issues of non-taxability of rice in Vietnam are discussed elsewhere, for example, in Goletti et al. (1996), Goletti and Minot (1997), and Gulati and Narayanan (2002). Gulati and Narayanan (2002) suggest that poorer developing countries in the South and Southeast Asia have been taxing rice producers, with domestic producers prices often less than three-fourths of world prices.

[3] See Adelman and Berck (1991) for an analysis of the merits of alternative food policy issues due to stochastic shocks arising from fluctuations in domestic food supplies and international prices.

[4] Minot and Goletti (1998) use a multi-market spatial equilibrium model to analyse the welfare impacts of rice export liberalization in Vietnam but come to different conclusions. Their model results suggest that, "although rice export liberalization would raise food prices and exacerbate regional inequality, it would also increase average real income and reduce (slightly) the incidence and severity of poverty".

that which prevailed in the mid-1990s. Producer price controls on rice are set by the government at below world market levels. Export quotas set the amount of rice to be sold on world markets, with the balance sold on domestic markets at a market clearing consumer price. We assume the only formal tax instrument available to government is manufacturing level sales (or enterprise) taxes.

In the agricultural sector, we model rice and other crop production as separate sub-sectors with decreasing returns to scale production functions in which agricultural labour is the variable factor. Agricultural labour is mobile between the two rural sub-sectors. In the urban sector, we model the production of manufactures and other goods as also subject to decreasing returns to scale, with urban labour as the mobile factor.

We calibrate the model to a 1995 micro-consistent data set for Vietnam. Data come both from various Vietnamese sources and IFPRI (1998), and we capture an approximate preexisting 30% differential between world and domestically controlled rice prices in this data. With the model specified in this way, we are able to compute a range of counterfactual equilibria, including those where price controls are removed and also where optimal tax rates on manufactures and controlled prices are jointly computed. Equilibria are computed on an equal yield basis; in the first case, adjustments are made in manufacturing sales tax rates. We also compute equilibria for a version of the model with adjustment costs for randomly generated exogenous shocks to world rice prices. We compute these equilibria for cases where price controls insulate the economy and where they do not, and compare across sequences of equilibria, which show the economy-wide response to external shocks in these cases.

Results indicate that moving from price controls to no price controls can be welfare worsening and that an optimal policy mix involves a significant role for price controls. Results also indicate that, in the presence of price shocks, price controls can play a key role in insulating the economy and avoiding incurring resource wasteful adjustment costs. In the Vietnamese rice price case, therefore, price controls seem to have significant redeeming features despite the general prevailing opinion against them.

2. Rice price controls in Vietnam

Rice comprises a substantial part of average Vietnamese food consumption, accounting for three quarters of the caloric intake of Vietnamese households (World Bank, 1995). The production and distribution system in Vietnam has experienced various government controls. The government has used quotas on rice to control exports, and regulated the movement of rice within the country, particularly between the North and South. State-owned enterprises have had a virtual monopoly on exports of rice and on North–South trade.[5] These regulations have generated differences in rice prices both between domestic sales and exports, and between North and South.

[5] There are also other barriers to entry in the export sector such as limited private access to information and credit for marketing.

These regulatory policies, it is often argued, are necessary to protect low-income consumers in Vietnam from food price increases, and to ensure legitimate internal trade while preventing smuggling.[6]

In 1981, the old system of centrally directed collective agriculture with plan targets for each collective for rice production, along with other agricultural production, was replaced by a contract system. In this system, individual rice farmers took responsibility for fulfilling their own production quotas rather than the collective, with any excess rice sold to a government marketing agency. In 1988, these reforms went further; private ownership of farm assets was legalized and cooperative land was leased to individual farmers.[7] Private sector trade in agricultural goods was also legalized and promoted, expanding the scope of agricultural markets (see the discussion in Goletti and Minot, 1997). Land tenure arrangements were strengthened and agricultural markets further liberalized in 1993 (Cuc, 1995).

Rice production in Vietnam responded dramatically to all these changes. Although production in the early stages of reform stalled in the mid-1980s, subsequent policy changes in the late 1980s generated more significant behavioural responses. Rice production grew at a rate of 5.6% between 1988 and 1995, transforming Vietnam from a rice importing to a leading rice exporting country. Along with improved incentives, increased production of rice reflected government investment in irrigation infrastructure and agricultural research to expand crop areas, improved water control, adoption of new varieties and increased cropping intensity (Goletti and Minot, 1997).

The commonly held view of price controls during the pre-reform period reflected redistributive considerations. Rice price controls were seen as pro-poor, even though efficiency retarding. But as we argue below, these controls had clear and positive attributes from an efficiency point of view. By requiring producers to sell at low prices to government marketing agencies who then resold at higher prices (either to consumers or for exports), they generated revenue. And if the alternative were urban taxes, they effectively broadened the tax base. In addition, such controls served to insulate the economy from external shocks with potentially significant adjustment costs. Rodrik (1998) argues societies that benefit the most from integration with world markets are those that possess the complementary institution at home that manage and contain distributive conflicts caused by external shocks. Rice price controls could be supported as one such institution, particularly in Vietnam where the price of rice is an important distributional variable as rice accounts for 75% of caloric intake of an average Vietnamese.[8] These are the arguments for price controls that we evaluate in this paper.

[6] See Goletti and Minot (1997). Goletti et al. (1996), in a report submitted to the Asian Development Bank, also recommended dismantling the rice quota system and removing restrictions on internal movement of rice in Vietnam. Goletti and Minot (1997) simulate the distributional effects of removing rice export quotas and of withdrawing restrictions on intra-regional movement of food within Vietnam.

[7] These new policies were approved by the politburo in 1986 and, effectively, were the first concrete measures taken towards marketisation (Irvin, 1995).

[8] A policy of rice price stabilization can also help to create the macro-economic stability that many believe is essential for sustained and rapid economic growth. See Dawe (2001).

3. General equilibrium models of Vietnamese rice production

To analyze the impacts of rice price controls on the performance of the Vietnamese economy, we use two variants of a numerical general equilibrium model that capture resource allocation effects both within agriculture (between rice and other crops) and more broadly between agriculture and manufactures. In the first, we analyse price controls as a base broadening device. In the second, we introduce adjustment costs as the economy responds to external shocks, i.e., world price volatility both in the presence and absence of domestic price control policies. Both model structures are the same but the second variant differs in also accommodating transactions costs associated with the domestic adjustment process. All rice output is treated as traded through a government marketing agency to whom all rice produced must be sold and which is then resold either at a market clearing consumer price on the domestic market or as exports. We calibrate the models to 1995 data and compute counterfactual equilibria both where price controls are removed and where an optimal mix of price controls and domestic taxes on manufacturing are used.

3.1. The model

In both models, there are two broad sectors with specific sub-sectors, rural (rice and other agricultural crops) and urban (manufacturing and services). Two households, a representative rural and urban household, define the demand and labour supply portions of each model. Labour is immobile across the rural and urban regions, but mobile within sectors. Agricultural labour and manufacturing labour are heterogenous; a representative rural household owns agricultural labour, while a representative urban household owns manufacturing labour. Production in all sectors is assumed to be decreasing returns to scale in labour, as labour is the only variable factor. Each producing sector uses a sector specific fixed factor, either capital or land. Each household has three sources of income, wages, rents from ownership of fixed factors, and transfers received from the government.

The government sets export quotas and domestic producers' prices for rice in each period. The producers' price and the quantity of rice exports are thus exogenous in the model. For simplicity, the government buys rice at the producers prices it sets, exports a portion of it at the international prices (higher than the producers' price) and sells the remaining portion in the domestic market at a market clearing price. The government is assumed to be the sole trader in rice. Domestic market clearing prices are generally higher than producers' prices, but lower than international prices. The government thus has two sources of revenue in the model; tax revenues from the manufacturing sector and profits from sales of rice to the domestic and international markets.

3.2. Production

We assume that production in each sector i, X_i, in each region (ignoring the regional subscripts for now) is a CES function of labour and sector-specific fixed factor, capital.

Rice and other crops are produced in the rural sector using rural labour and fixed factors, and manufacturing and services are produced in the urban sector using urban labour and fixed factors. These production functions can be written as

$$X_i = \phi_i \left[\alpha_i L_i \frac{\sigma_i - 1}{\sigma_i} + (1 - \alpha_i) \bar{K}_i^{\frac{\sigma_i - 1}{\sigma_i}} \right]^{\frac{\sigma_i}{1-\sigma_i}}$$
$$(i = \text{rice, other food, manufacturing, and services}) \tag{1}$$

where ϕ_i is a scale parameter, L_i is the labour used in a sector i, $\bar{K}_i$ is the sector specific factor, α_i is the labour share parameter in the CES function, and σ_i is the elasticity of factor substitution in sector i. Labourers in both rural agricultural production and urban manufacturing and services are paid their marginal value product. Labour markets are segmented and it is assumed that there is no movement of labourers between rural and urban production, and vice versa. Rents from the fixed factor (land) in the two agricultural sectors accrue to the rural household, while rents in the manufacturing sector accrue to the factor owners in the urban sector.

3.3. Preferences

Rural and urban households each have preferences defined over goods and leisure and they decide how much labour to supply and how much leisure, rice, other crops, manufacturing and services to consume. This reflects maximization of a household utility function subject to a budget constraint. The commodity demand functions derived from CES utility functions in this way are,

$$C_i^h = \frac{\beta_i^h I^h}{\mathrm{Pc}_i^{\theta^h} \sum_{j \neq 1} \beta_i^h \mathrm{Pc}_j^{1-\theta^h}}$$
$$(i = \text{rice, other food, manufacturing, services, and leisure}) \tag{2}$$

where β_i^h is the CES share parameter on good i (i = rice, other crops, manufacturing, services, and leisure) for the representative household h in each region (regional subscripts are ignored). θ^h is the elasticity of substitution parameter for household h and Pc_i is the consumer price of good i. I^h is the income of the representative household in each region is given by

$$I^h = \bar{L}^h W^h + \sum_i \bar{K}_i^h R_i + \mathrm{TR}^h \qquad (h = \text{rural, urban}) \tag{3}$$

where $\bar{L}_h$ and $\bar{K}_i^h$ are the endowments of labour and fixed factors of household h. W^h and R_i are the wage rate and the rental rates accruing to the fixed factors owned by household h, and TR^h are transfers received by household h.

3.4. Prices

The producers' price of rice is set by the government, together with the level of the rice export quota. The consumer price of rice in both the urban and rural areas is the market clearing price, given the amount of rice production and exports (set by the export quota). Being a small open economy, the prices of both manufactured goods and services in Vietnam are assumed to be given internationally. The consumer prices for non-agricultural goods are given by

$$\mathrm{Pc}_i = \bar{P}_i(1 + \mathrm{TX}_i) \qquad (i = \text{manufacturing and services}) \tag{4}$$

where $\bar{P}_i$ is the international price of good i and TX_i is the domestic consumption tax rate on good i. We assume that there are no taxes directly applied to rice.

3.5. Equilibrium conditions

Given the international and controlled producer rice prices and tax rates, an equilibrium in this model is characterized by market clearing in goods and labour markets and government budget balance. This implies that consumer prices for manufactured goods and agricultural crops, and the consumer prices of rice are determined such that goods and labour market clear, i.e.,

$$\sum_h C_i^h + E_i - M_i = X_i \qquad (i = \text{rice, other food, manufacturing, and services}) \tag{5}$$

$$\bar{L}^{\mathrm{r}} = \sum_i L_i^{\mathrm{r}} + \mathrm{LE}^{\mathrm{r}} \qquad (i = \text{rice, other food, } r = \text{rural}) \tag{6}$$

$$\bar{L}^{\mathrm{u}} = \sum_i L_i^{\mathrm{u}} + \mathrm{LE}^{\mathrm{u}} \qquad (i = \text{manufacturing, services, } u = \text{urban}) \tag{7}$$

where $\bar{L}^{\mathrm{r}}$ and $\bar{L}^{\mathrm{u}}$ are, respectively, the endowments of rural and urban labour, and M_i and E_i are the quantity of imports and exports of good i. L_i^{r} and L_i^{u} denote labour used in production of good i in the rural and urban sectors. LE^{u} and LE^{r} define leisure consumed by the urban and rural households, respectively. In addition, it is assumed that government budget balance holds and trade balance is given by

$$\bar{B} = \sum_i \mathrm{PM}_i \cdot M_i - \sum_i \mathrm{PE}_i \cdot E_i \tag{8}$$

where $\bar{B}$ is the exogenous trade balance (financed through foreign aid). PM_i and PE_i are the international prices of imports and exports. The trade balance is exogenously set and can be any number rather than zero. This can be thought of as one time transfer as foreign aid/

or exogenous capital inflows. There is no exchange rate in the model as this is a pure barter, real side model in which money does not appear.[9]

3.6. Adjustment costs

Our second variant of these models captures adjustment costs as the economy responds to external shocks reflecting volatility in the world price of rice. To do this, given an initial base case equilibrium, we assume that any movement of labour between sectors involves a real resource cost borne by the adjusting labour. This creates a dual price system for any labour type in so far as users of labour pay gross of adjustment cost wage rates in expanding sectors, while suppliers of such labour originally in the contracting sectors receive net of adjustment cost wage rates. Workers relocating from one kind of production activity to the other thus face an explicit adjustment cost, and so through the adjustment process the economy's labour endowment is depleted.

For simplicity, given our focus on rice we assume that adjustment costs only apply to the rural sector (and hence to agricultural production). The full employment condition for the adjusting factor is in the rural sector is thus given by

$$\bar{L}^{\mathrm{r}} - \delta\,|\,(L^{\mathrm{b}} - L^{\mathrm{c}})\,| = \sum_i L_i^{\mathrm{r}} + \mathrm{LE}^{\mathrm{r}} \quad (0 < \delta < 1) \tag{9}$$

where L^{b} and L^{c} are labour employed in the rice sector before and after the shock, respectively. $|(L^{\mathrm{b}} - L^{\mathrm{c}})|$, therefore, represents the absolute amount of labour reallocating within the rural sector due to adjustment to the external shock (international price volatility). δ is the proportional resource depleting factor associated with adjustment.

When moving from one sector to the other, workers receive $(1-\delta)$ times the wage in the high wage sector. Assuming that movement of labour into rice production from the other crops takes place, the wage rate in food production (w^{f}) relative to rice (w^{r}) is given by

$$w^{\mathrm{f}} = (1-\delta)w^{\mathrm{r}} \qquad (\text{where } r = \text{rice},\ f = \text{other food production}) \tag{10}$$

For simplicity, we assume costless transfer of labour within the urban sector. Labour reallocation in this sector thus does not involve any adjustment cost.

4. Data and parameter values used in the model

We have used the model set out in the previous section to analyze the implications of rice price controls for the Vietnamese economy, with our model calibrated to Vietnamese

[9] See Whalley and Yeung (1984) for an analysis of the pitfalls in claiming an interpretation for a financial exchange rate in a model with no money.

data for 1995. The basic data we use in calibrating the model are drawn from the Global Trade Analysis Project (GTAP) version 4 Database (1999). This is a multi-country data set on consumption, production, trade, and other trade relevant variables (such as trade barriers), which has been assembled for multi-country work using general equilibrium models of standard form (typically, CES production, and demand functions). We augment the GTAP data by adding further elements. We have been able to extract components of this larger data set relevant to Vietnam, and aggregate them into four sectors: rice, other crops, manufactured goods, and services (Table 1). This 1995 data is transformed into model admissible form by ensuring that demand supply equalities and other model equilibrium conditions hold.

Value added by factor, namely land, skill and unskilled labour, capital and natural resources is available for 50 commodity sectors from GTAP (1999) databases and there are aggregated into two factors, labour and capital and four sectors. The way this is done is set out in Table 1. Capital is treated as a fixed factor in each sector. In the base case data, we assume that wage rates within rural and urban sectors are the same.

In Table 2, we report our benchmark data set and elasticity parameters used in calibrating the model. Rice constitutes around 7% of value added. Vietnam is a net exporter of rice and the world's second largest exporter after Thailand; around 20% of rice produced in Vietnam is exported. Other exports from Vietnam include other food crops and services as defined in Table 1.

The benchmark Vietnamese data imply a large trade imbalance. We treat this as a one time transfer to Vietnam and keep it constant in all the simulation exercises reported on.

Table 1
Mapping scheme followed in model admissible data aggregation using data from GTAP database

Model categories	GTAP categories
Aggregated commodities/factors	Commodities/factors
Labour	Skill and unskilled labour
Capital	Capital, natural resources
Rice	Paddy rice, processed rice
Food	Wheat, cereal grains nec, vegetables, fruit, nuts, oil seeds, sugar cane, sugar beet, plant-based fibers, crops nec, bovine cattle, sheep and goats, horses, animal products nec, raw milk, wool silk-worm cocoons, forestry, fishing, meat products nec, vegetable oils and fats, dairy products, sugar, food products nec, beverages and tobacco products
Manufacturing	Coal, oil, gas, minerals nec, bovine cattle, sheep and goat, horse meat prods, textiles, wearing apparel, leather products, wood products, paper products, publishing, petroleum, coal products, chemical, rubber, plastic products, mineral products nec, ferrous metals, metals nec, metal products, motor vehicles and parts, transport equipment nec, electronic equipment, machinery and equipment nec, manufactures nec
Services	Electricity, gas manufacture, distribution, water, construction, trade, transport, financial, business, recreational services, public admin and defence, education, health, dwellings

Table 2
1995 Base case data and key parameter assumptions

Basic data

	Production		Export		Import		Tax rates applicable on domestic consumption[a]
	US$ (in Millions)	As % of total output	US$ (in Millions)	As % of output	US$ (in Millions)	As % of output	
Rice	747.5	6.6	149.5[b]	20.0	0.0	0.0	0.00
Food	2840.0	25.1	1203.5	42.4	0.0	0.0	0.14
Manufacturing	2277.1	20.1	0.0	0.0	3591.4	157.7	0.20
Services	5444.3	48.1	1340.0	24.6	0.0	0.0	0.10
Total	11 309.9	100.0	2693.0	23.8	3591.4	31.8	–

Trade balance (US$ (in Millions)): (−) 898.4
Domestic controlled price of rice 1.0
World price of rice 1.3
Price wedge between the international and domestic price of rice = 0.3 (30%)
Government revenue as percentage of GDP = 8% (only consumption taxes are included)

Key parameters

	Rural households	Urban households
Elasticity of substitution in preferences	1.2	1.2
Elasticity of factor substitution in agri production	0.6	
Elasticity of factor substitution in other production	1.2	

Source: GTAP Version 4 Database.
[a] Tax rates assumed on the basis of discussions with Vietnamese researchers.
[b] Adjusted to reflect the feature that 20% of rice output is exported.

To reflect the characteristics of rice price control arrangements in Vietnam, we assume that the domestic consumers' price is 10% higher than that of producers.[10] The international price was estimated to be 30% higher than the producers' price in 1995 (see Goletti and Minot, 1997). We use the same price wedge between the domestic producers' price and the international price in our model calibration. The difference between the government buying price and selling price of rice is modelled as a revenue raising device, a quasi tax.

We calibrate alternative versions of the model to reflect different characteristics of the assumed policy regime, such as with or without an export quota in our base case (as

[10] Until recently, producers' prices of rice in Vietnam were controlled by the government. The State trading agencies (STA) were the principal buyers of rice at the government declared prices, and were also the main sellers of rice both at domestic and international markets (exports). Effectively, there exist three sets of rice prices; the price received by rice producers (P^r), the domestic consumers' price (PC^r), determined through domestic demand supply forces, and the international price of rice(PE^r). The consumer price of rice in Vietnam lies between a lower producers' price and a higher international price of rice ($P^r < PC^r < PE^r$).

sometimes used in Vietnam). In the model with a quota, the relationships between rice prices that producers receive (P^r), consumers pay (PC^r), and international prices (PE^r) are given by $P^r < PC^r < PE^r$. In the case without export quotas, the rice price is still controlled by the government but the domestic consumer and international prices for rice are the same. The relationship among these rice prices in this version is thus given by $P^r < PC^r = PE^r$.

Government revenue is computed on the basis of assumed tax rates for food, manufacturing and services, and the price wedge between producers and consumers' prices and between producers' and international prices of rice.

To calibrate other model parameter values, such as consumption shares and factor shares for the model we need to specify values for elasticity parameters. Estimates for these parameters for Vietnam are, however, not available. We specify values for these parameters using judgement and literature estimates available for other countries (Piggot and Whalley, 1996, for instance). We use a value of 1.2 for the elasticity of substitution in consumption, and elasticities of factor substitution in agricultural and urban productions of 1.2 and 0.6, respectively. We assume an adjustment cost parameter (δ) of 0.15 (15%) for labour reallocating due to international rice price volatility. We compare model simulation results with and without adjustment costs.

The remaining parameters of the model are determined using calibration and exogenously specified values of the elasticity parameters along with the base case micro-consistent data set reported in Table 2 (see Mansur and Whalley, 1984 for a discussion of calibration procedures widely used in computable general equilibrium modelling). We later perform sensitivity analyses around the exogenously specified values of the elasticity parameters.

In computing counterfactual equilibria, we focus on two different scenarios. First, we analyse the implications of price controls for economic efficiency by replacing price controls by an equal yield preserving tax on the remaining sectors. In the other, we maintain government revenue but optimize jointly on the setting of the producer price for rice and the tax rates on manufactured products. We find that, while removing price controls is welfare worsening, the optimal mix of price control and taxes on other sectors is welfare improving.

In the second scenario, we introduce transactions costs as discussed in the previous section, but compute sequences of equilibria, one with price controls and the other without price controls, as price shocks hit the economy and disappear later across periods. We find that policies of price controls dominate no price controls in the presence of volatile world prices, because price controls can act as to dampen costly adjustment in the face of volatile world prices.

5. Model results

We have used both versions of the model set out above and the 1995 base case data and calibrated parameters generated for the Vietnamese economy to numerically investigate the role that price controls can play as a way of effectively broadening the tax base to hard to tax sectors. We also analyze the key role they can play in insulating the

Table 3
Analyses of the impacts of modifying rice price controls in the presence of export quota controls in Vietnam, 1995 data

1. Removing rice price controls[a]	
Welfare gain (Hicksian EV as % of income)	
• Rural	0.5348
• Urban	− 0.3174
• Total	− 0.0294
% change in rice production	4.02
% change in food production	− 1.02
% change in leisure consumption	− 0.21
% change in rural wage rate	1.17
% change in producer price of rice	6.01
% increase in manufacturing tax rate	4.83
2. Optimal mix of price control on rice and manufacturing taxes[b]	
Welfare gain (Hicksian EV as % of income)	
• Rural	− 0.378
• Urban	0.204
• Total	0.0072
% change in rice production	− 3.034
% change in food production	0.724
% change in leisure consumption	0.180
% change in rural wage rate	− 0.822
% change in producer price of rice in optimality	− 4.24
% change in manufacturing tax rate	− 3.279

[a] Base case producers price (P) < consumer price (PC) < international price (PE). In counterfactual P = PC.

[b] Base case producers price (P) < consumer price (PC) < international price (PE). In counterfactual optimization of controlled rice price (P) occurs.

economy in the presence of exogenous price shocks by saving the economy from wasteful resource adjustments.

Results from removing price controls in the model in the presence of export quotas in both base and counterfactual cases are reported in Table 3. The results show a fall in welfare measured in terms equivalent variation (EV) of 0.03% of GDP if price controls are withdrawn. This is because rice price controls raise revenue for the government, and in their absence higher more distortionary taxes are needed in manufacturing. Rice production increases by 4% in the absence of controls, and the manufacturing tax rate increases by around 4% to preserve government revenue.

The next simulation shows that fixing the producers' price of rice through an optimal mix of rice price controls and manufacturing taxes brings a gain of 0.007% of GDP. This implies that the optimal controlled producers' price for rice is lower than that in the benchmark.[11] Manufacturing taxes fall by 3% and the production of rice also falls due to the fall in the rice price. Thus, these simulation results clearly show that controlling

[11] This result is consistent with the famous Ramsey rule that says that optimal taxes on commodities are inversely proportional to the compensated demand elasticities. We find that the associated compensated point elasticities in this case are − 1.193 in rice and − 1.199 in manufacturing. Therefore, taxing manufacturing is more distorting than taxing rice via price controls.

Table 4
Elasticity (of substitution in preferences, θ^h) sensitivity analyses of the impacts of modifying rice price controls in the presence of export quota controls in Vietnam, 1995 data

1. Removing rice price controls[a]	Base $\theta^h = 1.2$	$\theta^h = 0.6$	$\theta^h = 6.0$
Welfare gain (Hicksian EV as % of income)			
Rural	0.535	0.374	0.788
Urban	− 0.317	− 0.218	− 0.553
Total	− 0.0294	− 0.0178	− 0.0998
% change in rice production	4.02	2.778	6.566
% change in producer price of rice	6.017	4.189	9.362
% increase in manufacturing tax rate	8.83	4.337	6.336
2. Optimal mix of price controls on rice and manufacturing taxes[b]			
Welfare gain (Hicksian EV as % of income)			
Rural	− 0.378	− 0.2408	− 0.950
Urban	0.204	0.1287	0.558
Total	0.0072	0.0038	0.0483
% change in rice production	− 3.034	− 1.853	− 9.044
% change in producer rice price	− 4.24	− 2.672	− 11.240
% change in manufacturing tax rate	− 3.28	− 2.762	− 6.424

[a] Base case producers price (P) < consumer price (PC) < international price (PE). In counterfactual P = PC.
[b] Base case producers price (P) < consumer price (PC) < international price (PE). In counterfactual optimization of controlled rice price (P) occurs.

Table 5
Sensitivity analyses of the impacts of modifying rice price controls in the presence of export quota controls in Vietnam to different pricing assumptions, 1995 data

1. Removing rice price controls[a]	Base		
	P = 1.0 PC = 1.1 PE = 1.3	P = 1.0 PC = 1.05 PE = 1.3	P = 1.0 PC = 1.01 PE = 1.3
Welfare gain (Hicksian EV as % of income)			
Rural	0.535	0.2643	0.0523
Urban	− 0.317	− 0.1602	− 0.0323
Total	− 0.0294	− 0.0167	− 0.0037
% change in rice production	4.02	2.054	0.418
% change in producer price of rice	6.017	3.012	0.603
% increase in manufacturing tax rate	8.83	2.410	0.481
2. Optimal mix of price controls on rice and manufacturing taxes[b]			
Welfare gain (Hicksian EV as % of income)			
Rural	− 0.378	− 0.577	− 0.733
Urban	0.204	0.320	0.415
Total	0.0072	0.0166	0.0271
% change in rice production	− 3.034	− 4.766	− 6.207
% change in producer rice price	− 4.24	− 6.559	− 8.435
% change in manufacturing tax rate	− 3.28	− 5.058	− 6.491

[a] Base case producers price (P) < consumer price (PC) < international price (PE). In counterfactual P = PC.
[b] Base Case producers price (P) < consumer price (PC) < international price (PE). In counterfactual optimization of controlled rice price (P) occurs.

Table 6
Analyses of the impacts of modifying rice price controls, in the absence of export quotas in Vietnam, 1995 data

1. Removing rice price controls	
Welfare gain (Hicksian EV as % of income)	
• Rural	2.98
• Urban	– 1.40
• Total	0.082
% change in rice production	17.50
% change in food production	– 4.98
% change in leisure consumption	– 0.85
% change in rural wage rate	5.83
% change in producer price of rice	30.00
% change in manufacturing tax rate	15.92
2. Optimal mix of price controls on rice and manufacturing taxes	
Welfare gain (Hicksian EV as % of income)	
• Rural	2.22
• Urban	– 1.00
• Total	0.93
% change in rice production	13.60
% change in food production	– 3.74
% change in leisure consumption	– 0.72
% change in rural wage rate	4.34
% change in producer price of rice in optimality	22.40
% change in manufacturing tax rate	11.29

producers price of rice is not necessarily bad in Vietnam, and significant welfare improvements can be achieved by an optimal rice price and manufacturing tax configuration. This is particularly relevant in other developing countries, such as India, where agricultural income and production are hard to tax for political and other considerations.

Table 7
Sensitivity analyses of results of removing or modifying rice price controls to key production side parameters

		Results from Table 3	Double elasticities in production in rice and other crops	Halve elasticities in production in rice and other crops
Welfare gain from eliminating rice price controls in the presence of export quotas (Hicksian EV as % of income)	Rural	0.54	0.36	0.69
	Urban	– 0.32	– 0.24	– 0.39
	Total	– 0.03	– 0.04	– 0.02
Welfare gain from eliminating rice price controls in the absence of export quotas (Hicksian EV as % of income)	Rural	2.98	3.45	2.78
	Urban	– 1.40	– 1.37	– 1.42
	Total	0.08	0.26	0.006
% change in rice production from eliminating price controls in the presence of export quota		4.02	5.7	2.5
% change in rice production from eliminating price controls in the absence of export quota		17.5	41.0	8.1

Table 8
Comparing the behaviour of the Vietnamese economy to outside rice price shocks in both the presence and absence of price controls (adjustment cost $\delta = 15\%$)

	Equilibrium sequences						
	With price controls		Without price controls				
Period of analysis (years)	Rice production (US$ (in Millions))	Internal consumer price	Rice production (US$ (in Millions))	Internal consumer price	Within period EV (from price controls as % of income)		
					Rural	Urban	Total
1. Base year (world price 1)	747.5	1.0	747.5	1.0	–	–	–
2. Initial price shock (world price rise to 1.15)	745.9	1.15	817.3	1.15	– 0.99	0.55	0.02
3. Second price shock (world price falls to 0.85)	749.2	0.85	657.7	0.85	1.46	– 0.56	0.12
4. Return to long run steady state (world price returns to 1.0)	747.5	1.0	746.0	1.0	0.31	0.10	0.17
Comparison across the full sequence of four equilibria (money metric welfare gains under price controls relative to no price controls computed as a sum of the gains over the three sequences above)					0.78	0.09	0.30

There is a small change in rice output even in the model with price control because the model has leisure and both leisure consumption and production are affected by changes in the international price of rice.

Tables 4 and 5 report sensitivity of our model results to elasticity parameters and assumptions used on pricing levels in the base case. Results are sensitive to these parameters, but the broad themes of results remain.

Results from model runs where export quotas are absent are reported in Table 6. In these cases, removing rice price controls shows sharper welfare effects. Aggregate welfare rises by 0.08% of GDP compared with a fall in the model with a rice quota. Rice production increases by larger magnitudes compared to models with a quota because large quantity responses occur. Manufacturing tax rates adjust more. The beneficial welfare impacts from broadening the tax base by setting an optimal producer price as a revenue raising device in an otherwise non-taxable rice producing sector are larger.

We also perform sensitivity analyses around values of the elasticity parameters specified exogenously. These results are reported in Table 7. We find that in both cases (with and without a rice quota) a lower elasticity of substitution in rural production implies higher welfare impacts from removing price controls. Changing values of elasticity parameters in urban production does not affect welfare.

We next analyse the implications of price controls in the presence of world price volatility. For this, we modify our model to introduce transaction costs as outlined earlier. Using this model, we compute two sequences of equilibrium, one with controlled producers price of rice and a second in which producers are treated as takers of international prices. To reflect the volatility of rice prices in international markets, we model three periods with myopic changes in rice prices occurring across the sequence. In the first period, the rice price rises by 15% from its benchmark value; in the second prices fall by 15% from the benchmark and finally prices change back to their benchmark levels. As described earlier, moving from one equilibrium to the other involves transaction costs (adjustment costs) as workers move between sectors. We assume that the economy's labour endowments are depleted by a fraction (0.15) of the absolute amount of labour, which moves in or out of the rice production between equilibria. In reality, adjustment costs may be of various kinds. For example, switching from one kind of crop production to other in agriculture may require changing the land plot requiring additional costs in terms of services of various kinds of machinery, technology, or training.

Results in Table 8 indicate that in the absence of price controls there is a large response to rice production as international prices of rice change. Production of rice first increases as prices rise, and then falls as international prices fall. The welfare impact of price controls compared to no price controls are positive if international prices are volatile because by using to price controls one can avoid transaction costs (adjustment costs) in switching between production across periods. Thus, the policy of price controls dominates that of no price controls in the presence of international price volatility in this case.

6. Concluding remarks

In this paper, we evaluate price control policies for rice production in Vietnam. We develop a multi-sector numerical general equilibrium model for the Vietnamese economy using 1995 data, highlighting two important implications for price controls, which can be used to support them from a national welfare point of view. The first are the public finance considerations. In low income economies with a large agricultural sector and a limited set of feasible options for taxation, price controls can be used as a revenue raising device by the government as a substitute for broadening the tax base beyond the manufacturing. With a controlled producer price set below consumer prices, buying and reselling rice raises revenue for the government per unit transacted (i.e., price controls are akin to a consumption tax). Our results suggest that if an optimal policy-mix of manufacturing level taxes and price controls were to be designed (including rice price controls as part of the mix) may well make sense.

Secondly, we show that having price controls can also make sense in the presence of stochastic external shocks that involve adjustment costs. If shocks hit the economy, under myopic behaviour these will generate behavioural responses, which have adjustment costs (as labour moves between crops in the event of rice price changes and land is redeployed). A price control regime can have the effect of insulating domestic markets from external fluctuations, and reducing (or in the limit eliminating) transactions costs. These two features of price controls may more than compensate for their traditional price distorting costs.

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