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# AGRICULTURE-BASED DEVELOPMENT: A SAM PERSPECTIVE ON CENTRAL VIET NAM

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# A SAM PERSPECTIVE ON CENTRAL VIET NAM

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## ABSTRACT

As in most low-income countries, the majority of the poor population in Viet Nam is found in rural areas, where agriculture provides the primary means of livelihood. It has been argued that an agriculture-based development (ABD) strategy is more appropriate for Viet Nam at the present time than both import-substitution and export-led industrialization, considering its effectiveness in generating income opportunities, directly and indirectly, for the rural population. Under the ABD strategy, increased public resources allocated to agriculture and the rural sector would lead to rising agricultural productivity and rural income that in turn would create a strong demand for increased nonagricultural production in the local economy, especially of labor-intensive industrial goods and services. It is in effect a decentralized, employment-generating industrialization strategy that can lead to favorable outcomes in overall income growth and distribution.

The Central Region in Viet Nam is the least developed among the three macro-regions, the rapid economic expansion during the 1990s having been concentrated in the southern and northern areas. Because Central Viet Nam is even more heavily agricultural than the rest of the country, the argument for adopting an ABD strategy would seem to apply with greater force. In this paper we make use of SAM (social accounting matrix) multiplier analysis in examining quantitatively the comparative economy-wide repercussions of exogenous income increases in agriculture (such as that arising from productivity growth) in Central Viet Nam, paying particular attention to the effects on overall income growth and equity. The equity impact is evaluated in terms of the induced relative changes on the incomes of four households groups distinguished in the study. Some policy implications of the results are discussed, emphasizing the role of macroeconomic policies in helping promote equitable growth in Central Viet Nam.

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## I. Introduction: Why Agriculture-Based Development?

The two most pressing challenges for national policy makers in Viet Nam at the present time are the resumption of rapid economic growth and the reduction of income disparities among various population groups. For more than a decade since the far-reaching policy and institutional reforms began to be implemented in 1986 under the *doi moi* program, the Vietnamese economy has had remarkable success in achieving exceptionally high growth rates. The recently estimated average annual GDP growth rate of 8.6 percent (in real terms) for 1986-97 compares favorably with the growth performance not only of other developing countries in general but also of the economically very dynamic East Asian countries. Moreover, poverty has been significantly reduced from a very high initial level of 70 percent to 51 percent in 1992-93 and about one-third in 1997-98.

In the last two years, however, economic growth has slowed considerably, real GDP growth declining to about 4 percent per annum from nearly 9 percent in 1997. Per capita income in Viet Nam has remained low relative to most of its ASEAN country neighbors, and some quality-of-life indicators (for example, child malnutrition and access to safe water) are among the most unfavorable in Asia (Bautista 1999). Regional income inequality has also worsened since the early 1990s, accompanied by a widening rural-urban income gap.

The promotion of economic growth with equity in Viet Nam has been made more difficult and urgent by the crisis afflicting most of the East Asian economies for more than two years now. Not only have the latter countries been the biggest market for Viet

Nam's exports, accounting for four-fifths of the total in recent years, they are also the country's most important source of foreign direct investment (FDI), contributing about two-thirds of the total during the 1990s. Drastic reductions in export growth and in FDI contributed heavily to the sharp decline in GDP growth over the past two years.

As in most low-income countries, the majority of the poor population in Viet Nam is found in rural areas, where agriculture provides the primary means of livelihood. It has been argued that an agriculture-based development (ABD) strategy is more appropriate for Viet Nam at the present time than both import-substitution and export-led industrialization (Lincoln International 1999), considering its effectiveness in generating income opportunities, directly and indirectly, for the rural population. There is no question that Viet Nam should aspire to industrialize; however, it is not clear what industrial growth path should be followed at this stage of its development. The Vietnamese government does not seem to have reached a consensus yet on an economic development strategy that can be used to establish priorities in government expenditure and in undertaking further reforms (Riedel 1998).

Under the ABD strategy, increased public resources allocated to agriculture and the rural sector would lead to rising agricultural productivity and rural income that in turn would create a strong demand for increased nonagricultural production in the local economy, especially of labor-intensive industrial goods and services (Mellor 1986). It is in effect a decentralized, employment-generating industrialization strategy – Adelman (1984) describes it as "agricultural demand-led industrialization" – that can lead to favorable outcomes in overall income growth and distribution. Later, when a sizeable and regionally dispersed, labor-intensive manufacturing capacity has been established in Viet

Nam, the strategy can rightly shift to export-oriented industrial development that would exploit fully the country's comparative advantage in world markets.

The Central Region in Viet Nam is the least developed among the three macro-regions, the rapid economic expansion during the 1990s having been concentrated in the South (including Ho Chi Minh City) and in the North (including the two major urban centers, Hanoi and Haiphong). Per capita GDP for the entire country in 1997 was 1.6 times that of Central Viet Nam. Poverty incidence is also significantly higher in the Central Region, which has 28 percent of the country's population but accounts for 37 percent of the poor. The region's relative underdevelopment has become a major concern of the national government.

Because Central Viet Nam is even more heavily agricultural than the rest of the country (see below), the argument for adopting initially an ABD strategy would seem to apply with greater force. In this paper we make use of SAM (social accounting matrix) multiplier analysis in examining quantitatively the comparative economy-wide repercussions of exogenous income increases in agriculture (such as that arising from productivity growth) in Central Viet Nam, paying particular attention to the effects on overall income growth and equity. The equity impact is evaluated in terms of the induced relative changes on the incomes of four household groups distinguished in the study.

A well-known limitation of the standard SAM model is the assumption of no supply constraints over the range of outputs permitted by demand.[1] This allows one to impose the condition that prices remain unchanged, which is assumed even in the so-

[1] See Pyatt and Round (1985) for a discussion of the SAM structure, and Robinson and Roland-Holst (1988) and Thorbecke (1998) for perspectives on SAM-based modeling.

called "constrained multiplier" approach.[2] Such fixed-price behavior may well be a reasonable approximation for the services sectors that produce for local demand, as well as for highly tradable goods whose domestic prices are set by foreign prices. However, not all sectors have excess capacity, and most domestic products are only imperfectly substitutable to traded goods. Relative price effects arising from changes in sectoral supply and demand conditions are taken into systematic account in the analytically more sophisticated CGE (computable general equilibrium) framework. Nevertheless, Adelman and Taylor (1991) have argued that general-equilibrium constraints often lead to excessive price changes and an understatement of quantity adjustments. Corresponding results from SAM and CGE models might then provide the upper and lower bounds on the induced changes in real incomes.

Section II describes briefly the construction of the 1997 SAM for Central Viet Nam,[3] which integrates national income, input-output, flow-of-funds, and foreign trade statistics into a comprehensive and consistent data system, capturing the interdependencies existing within the regional economy during that year. In Section III the structure of the Central Viet Nam economy is examined using the 1997 SAM. The analysis of inter-sectoral linkages in the regional economy based on the calculated SAM "multipliers" is undertaken in Section IV. The paper concludes in Section V with some policy implications of the results, emphasizing the role of macroeconomic policies in helping promote equitable growth in Central Viet Nam.

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[2] This modified SAM multiplier methodology allows for limited or even no supply response in output-constrained sectors while maintaining the assumption of excess capacity in all other non-supply constrained sectors.

[3] A more detailed description can be found in GSO (1999).

## II. A 1997 SAM for Central Viet Nam

A *social accounting matrix* is a square table describing quantitatively the transactions taking place in an economy during a specified period of time, typically a year. Each account in the SAM is represented by a row and a column of the table. By convention, each cell of the matrix represents an expenditure of the column account and a revenue to the row account. The underlying principle of double-entry accounting requires that total revenue (row total) must equal total expenditure (column total) for each account in the SAM. Construction of a disaggregative SAM in developing countries is often made difficult by insufficient and fragmented data sources as well as by problems of data reliability. In many cases the process of SAM estimation has a social value in itself as it provides a consistency check on various data sources and helps identify data gaps and errors (Thorbecke 1998).

The Central Region SAM for 1997 built and used in the present study represents the first successful effort to construct a regional SAM in Viet Nam. By comparison, the existing SAMs are for the whole country, pertain to earlier years, and are much more aggregative. For example, work done at the Institute of Information Technology produced a 1995 SAM for Viet Nam with nine production sectors (Chan et al. 1998), compared with 25 in the present study. Building the 1997 Central Region SAM entailed the collaboration of the Development Strategy Institute (DSI) and two departments at the General Statistical Office (GSO), namely, the National Accounts Department and the Social and Environmental Department. Various data sources were used, and even though many came from within the GSO, there were data discrepancies that needed to be reconciled and data gaps to be filled.

The SAM disaggregation is as follows:

*Activities/commodities*

1. Rice
2. Maize
3. Cassava
4. Sweet potato
5. Sugarcane
6. Other crops
7. Livestock
8. Forestry
9. Fishing
10. Mining
11. Rice milling
12. Other food processing
13. Textiles and garments
14. Leather and footwear
15. Wood and paper products
16. Fertilizer
17. Chemicals
18. Cement
19. Metal products
20. Equipment and machinery
21. Other manufacturing
22. Electricity and water
23. Construction
24. Trade and transport
25. Other services

*Factors/value added*

26. Agricultural labor VA
27. Unskilled nonagricultural labor VA
28. Skilled nonagricultural labor VA
29. Nonlabor, agricultural VA
30. Nonlabor, nonagricultural VA

*Households*

31. Low-income rural HHs
32. High-income rural HHs
33. Low-income urban HHs
34. High-income urban HHs

*Enterprises*

35. State-owned enterprises (SOEs)
36. Non-SOEs

37. *Government*

38. *Capital*

39. *Rest-of-the-world (ROW)*

The classification of production activities/commodities reflects the importance of, and the study's emphasis on, agriculture and its inter-sectoral linkages in Central Viet Nam's economy. Equity considerations motivate the distinction between low- and high-income households in both rural and urban areas; by definition, low-income households are in the lowest two quintiles in income distribution. Moreover, differences in the expenditure patterns of these household groups determine the magnitude of consumption linkages and their effect on overall growth of the regional economy. In view of their inherent differences, there is a compelling need to differentiate enterprises between SOEs

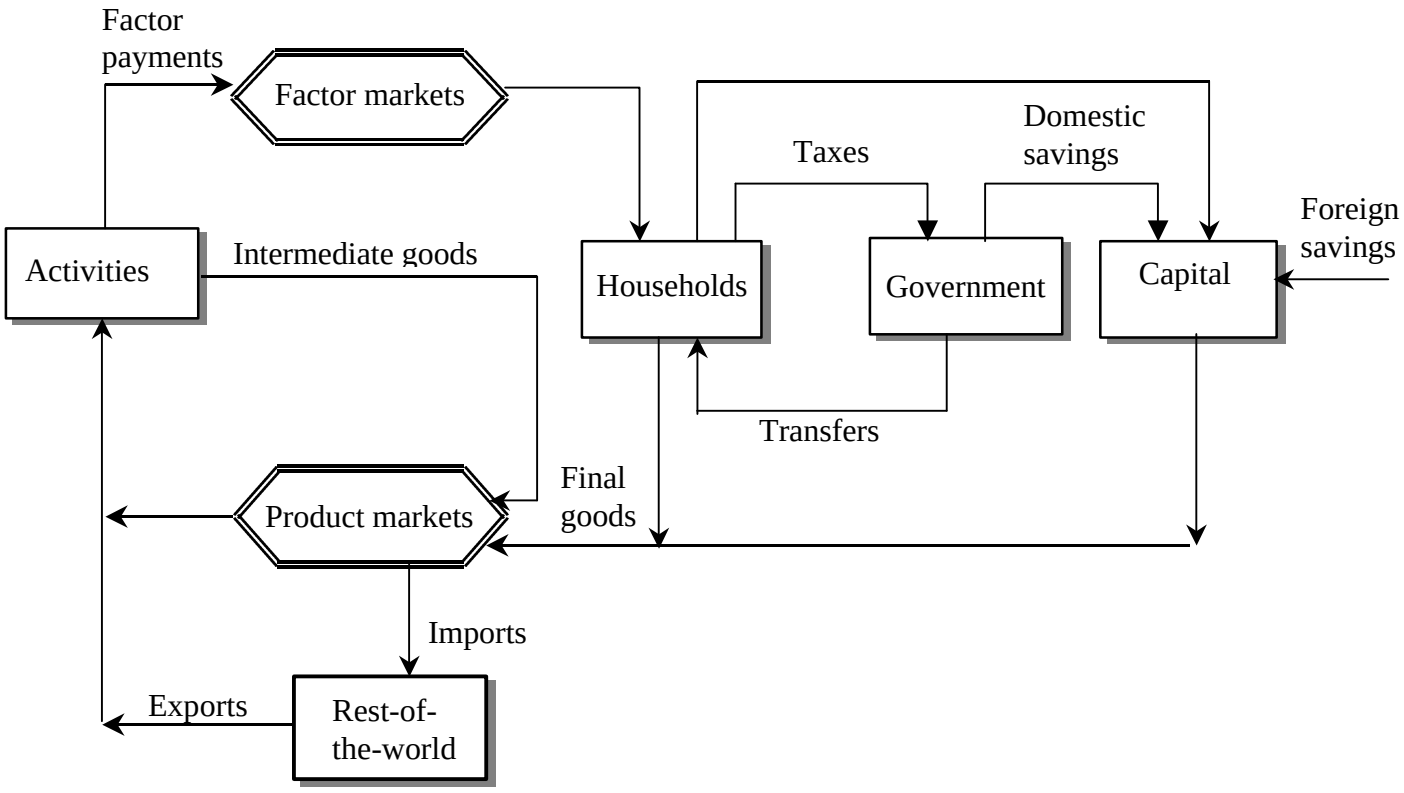
and non-SOEs. Finally, it bears emphasizing that Rest-of-the-world includes not only the foreign sector but also the rest of Viet Nam (outside the Central Region).

The three principal sources of data used to construct the 1997 SAM for Central Viet Nam are: (1) the ad hoc field surveys conducted by GSO in 1996 for preparing the Input-Output Table for the whole country, from which Central Region data are extracted; (2) the 1997-98 Viet Nam Living Standards Survey (VLSS), from which data on incomes, expenditures, transfers, and taxes for the four different household groups distinguished in the Central Region are obtained; and (3) national-accounts data for Central Region provinces submitted by local GSO offices, which are adjusted for consistency with independently estimated regional control totals. Various supplementary data sources are used to complete a preliminary and unbalanced SAM. Disparities between row and column totals that inevitably show up in some accounts are resolved by applying the standard RAS method that ensures matrix balance. A written report on the process of SAM estimation is available, together with the SAM transactions table, coefficient matrix, and multiplier matrix.

## III. Structure of the Central Viet Nam economy

The economic transactions represented in the SAM are portrayed, focusing on the income side, in the simplified diagram contained in Figure 1. It traces the circular flow of incomes from product markets through factor payments to households and back to product markets through sales of final goods. Additionally, income flows involving the government, rest-of-the-world, and capital account are included in the block diagram.

**Figure 1: Economy-wide circular income flow**




The aggregate version of the 1997 Central Region SAM estimated in the study is given in Table 1. It corresponds to the simplified framework of Figure 1, showing both incomes and expenditures for the seven basic SAM accounts (including enterprises) in the rows and columns, respectively. The following features of the economic structure of Central Viet Nam can be discerned from the aggregate regional SAM:

- Transactions with the rest of Viet Nam and overseas (*ROW*) are significant. One-fifth of total output of production *activities* is sold outside the region. *Households* and *government* (i.e., provincial governments in the Central Region) receive 6 percent and 40 percent of total income, respectively, from *ROW*.

**Table 1: Aggregate 1997 SAM for Central Viet Nam**
(in billion VND)

| | Activi-ties | Factors | House-holds | Enter-prises | Govern-ment | Capital | ROW | **Total** |
|---|---|---|---|---|---|---|---|---|
| Activities | 42294 | | 40735 | | 4978 | 14523 | 26884 | **129413** |
| Factors | 46694 | | | | | | | **46694** |
| Households | | 38034 | | 2434 | 1456 | | 2604 | **44528** |
| Enterprises | | 8659 | 437 | | 4 | | 7 | **9107** |
| Government | 5507 | | 1078 | 652 | | | 4749 | **11986** |
| Capital | | | 2152 | 5848 | 5537 | | 986 | **14523** |
| Rest-of-the-world | 34918 | | 126 | 173 | 12 | | | **35229** |
| **Total** | **129413** | **46694** | **44528** | **9107** | **11986** | **14523** | **35229** | **291480** |

- *Activities* sell 31 percent of total output for *household* consumption, 11 percent for *capital* formation, and 21 percent outside the region. They pay 33 percent of gross income for intermediate inputs, 36 percent for *factor* services, 4 percent for indirect taxes, and 27 percent for goods imported into the region.
- *Factor* payments consist of labor earnings (81 percent) allocated to *households* and "operating surplus" or non-labor value added (19 percent) allocated to *enterprises*.
- *Households* receive 85 percent of total income for labor services, 5.5 percent as distributed earnings from *enterprises*, and 3.3 percent as income transfer from *government*. They spend 91 percent of total income for final consumption, pay 2.4 percent for income tax, and save 4.8 percent.
- *Enterprises* distribute 27 percent of total earnings to *households*, pay 7.2 for income tax, and leave 64 percent as undistributed earnings after tax. They receive payments

for non-labor value-added (95 percent of total income) and from *households* (4.8 percent).

- *Government* income comes from indirect taxes (46 percent), *household* income tax (9.0 percent), *enterprise* income tax (5.4 percent), and *ROW* grants (40 percent). It spends 42 percent of total revenue for goods and services, transfers income to *households* (12 percent), and is left with a current fiscal budget surplus (46 percent).
- The combined *capital* account includes *household* saving (15 percent), after-tax undistributed earnings of *enterprises* (40 percent), *government* current account surplus (38 percent), and net capital inflow from *ROW* (6.8 percent).

The economy of Central Viet Nam is heavily agricultural. Based on the disaggregative (39x39) SAM, nearly half (47.5 percent) of the region's GDP is contributed by agriculture, quite large compared with the corresponding share (26.2 percent) for the whole country in 1997. On the other hand, the manufacturing sector in the Central Region is very small, accounting for only 10.5 percent of GDP; the corresponding figure for the national economy is 17.6 percent. Table 2 shows the production structure of agriculture and manufacturing in the Central Region. The dominant crop is rice, which contributes nearly one-fourth of total agricultural value added while the other principal crops (sugarcane, sweet potato, cassava, and maize) individually account for only 3.2 percent or less. Livestock and fishing are seen to have larger shares in agricultural production (14.1 and 11.5 percent, respectively) than the four crops combined. Forestry is also not an insignificant sector in the Central Viet Nam economy, accounting for 8.6 percent of total agricultural value added.

**Table 2: Agricultural and manufacturing value added in Central Viet Nam, 1997**

| Product | Value added (billion VND) | Percentage |
|---|---|---|
| ***Agriculture*** | 24,807 | 100.00 |
| Crops | 16,327 | 65.8 |
| Rice | *5,857* | *23.6* |
| Maize | *230* | *0.9* |
| Cassava | *627* | *2.5* |
| Sweet potato | *694* | *2.8* |
| Sugarcane | *801* | *3.2* |
| Others | *8,118* | *32.7* |
| Livestock | 3,507 | 14.1 |
| Forestry | 2,137 | 8.6 |
| Fishing | 2,834 | 11.5 |
| ***Manufacturing*** | 5,501 | 100.00 |
| Rice milling | 596 | 12.7 |
| Other food processing | 783 | 14.2 |
| Textile & garments | 342 | 6.2 |
| Leather & footwear | 83 | 1.5 |
| Wood & paper products | 316 | 5.8 |
| Fertilizer | 108 | 2.0 |
| Chemicals | 171 | 3.1 |
| Cement | 521 | 9.5 |
| Metal products | 228 | 4.1 |
| Equipment & machinery | 365 | 6.6 |
| Others | 1,888 | 34.3 |

Source: 1997 SAM for Central Viet Nam

In manufacturing the rice milling and other food processing sectors are the largest value-added contributors, with a joint share of 26.9 percent. The region's limited production capacity in light consumer goods is reflected in the small share of leather & footwear, textile & garments, and wood & paper products, which jointly accounted for only 13.5 percent of manufacturing value added, surprisingly lower than the combined

16.1 percent share of two capital-intensive industries (cement and equipment & machinery).

The external trade transactions of Central Viet Nam are summarized in Table 3. The first column indicates the degree of "export" orientation among the region's production sectors. With the exception of cassava, each agricultural account in the SAM is seen to sell at least 15 percent of total output outside the Central Region. "Other crops" (in particular, coffee), forestry, fishing, and livestock are the most outward-oriented, at least 44 percent of their output being shipped to the rest of Viet Nam and overseas. Among manufacturing sectors, the largest proportion of extra-regional sales (36 percent) is shown by textile & garments, while leather & footwear, wood & paper products, cement, and "other manufacturing" export a quarter or more of their output. In terms of the contribution to total sales outside the Central Region (shown in the second column of Table 3), the "other crops" sector dominates. Rice, livestock, forestry, fishing, and "other manufacturing" (alone among the 12 industrial sectors) are significant contributors. Finally, reflecting the relative underdevelopment of Central Viet Nam industry, "import" dependence of manufacturing sectors is seen, from the last column of the table, to be generally much higher than that of the other SAM accounts. Notably, at least four-fifths of product supply in the fertilizer, chemicals, metal products, and equipment & machinery sectors is purchased from outside the region.

Table 4 shows the income sources for each of the four household groups distinguished in the SAM. Payments for factor services in agriculture comprise the most important source, except for the low-income rural household group where income transfers from other households account for the largest share. The contribution of factor

**Table 3: Sectoral trade structure in Central Viet Nam, 1997**
(in percent)

| Activities/commodities | Ei/Yi | Ei/E | Mi/Yi |
|---|---|---|---|
| 1. Rice | 25.1 | 9.6 | 18.4 |
| 2. Maize | 21.7 | 0.3 | 3.6 |
| 3. Cassava | 6.5 | 0.1 | 0.2 |
| 4. Sweet potato | 19.9 | 0.6 | 0.3 |
| 5. Sugarcane | 15.5 | 0.6 | 13.9 |
| 6. Other crops | 64.2 | 31.2 | 21.2 |
| 7. Livestock | 44.0 | 9.8 | 0.0 |
| 8. Forestry | 62.3 | 6.3 | 0.0 |
| 9. Fishing | 45.2 | 8.1 | 0.0 |
| 10.Mining | 13.0 | 0.8 | 54.3 |
| 11.Rice milling | 5.3 | 1.6 | 10.4 |
| 12.Other food processing | 15.2 | 3.3 | 36.1 |
| 13.Textiles & garments | 36.3 | 4.3 | 56.4 |
| 14.Leather & footwear | 26.4 | 0.5 | 67.9 |
| 15.Wood & paper products | 28.2 | 3.3 | 50.9 |
| 16.Fertilizer | 0.0 | 0.0 | 94.2 |
| 17.Chemicals | 4.0 | 0.4 | 87.0 |
| 18.Cement | 28.4 | 2.1 | 36.8 |
| 19.Metal products | 11.0 | 1.2 | 80.9 |
| 20.Equipment & machinery | 1.3 | 0.4 | 94.0 |
| 21.Other manufacturing | 24.9 | 7.3 | 48.2 |
| 22.Electricity & water | 0.0 | 0.0 | 72.3 |
| 23.Construction | 0.0 | 0.0 | 0.0 |
| 24.Trade & transport | 14.1 | 5.1 | 0.0 |
| 25.Other services | 5.0 | 3.1 | 0.0 |

Source: 1997 SAM for Central Viet Nam

Note: Ei/Yi = share of exports in total value of output in sector i
Ei/E = share of sector i in total value of exports in Central Viet Nam
Mi/Yi = ratio of imports to total value of output in sector i

"Exports" and "imports" are, respectively, Central Region sales to and purchases from the rest of Viet Nam and overseas.

**Table 4: Sources of household income in Central Viet Nam, 1997**
(in percent)

| Income source | Low-income rural | High-income rural | Low-income urban | High-income urban |
|---|---|---|---|---|
| Factor payments from | | | | |
| Agriculture | 35.2 | 48.5 | 51.2 | 43.6 |
| Nonagriculture | 19.7 | 33.4 | 36.2 | 35.6 |
| Transfers from | | | | |
| Other HH groups | 42.1 | 2.5 | 4.5 | 2.5 |
| Enterprises | 2.0 | 5.4 | 5.9 | 5.8 |
| Government | 0.4 | 3.5 | 0.7 | 4.9 |
| Rest-of-the-world | 0.6 | 6.7 | 1.5 | 7.6 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 |

Source: 1997 SAM for Central Viet Nam

payments from nonagriculture ranges from 20 percent for low-income rural households to 36 percent for the two urban household groups. Distributed earnings from enterprises are relatively low by international standards. It may seem doubtful that income transfers from government favor high-income households in both rural and urban areas; however, as some analysts have noted (Chan et al. 1997:7), two major items in government transfers to households in Viet Nam are pensions and scholarships, to which more affluent households tend to have greater access. Remittances from outside the region are also received largely by the two high-income groups, and represent an insignificant income source for poorer households in rural and urban areas.

The consumption expenditure pattern for each household group corresponding to the SAM commodity classification is given in Table 5. Based on the expenditure shares, spending on agricultural products is highest for low-income rural households (29 percent), followed by the high-income rural and low-income urban groups (each about 23

**Table 5: Structure of household final consumption in Central Viet Nam, 1997**
(in percent)

| Activities/commodities | Low-income rural | High-income rural | Low-income urban | High-income urban |
|---|---|---|---|---|
| 1. Rice | 2.7 | 1.8 | 1.8 | 0.9 |
| 2. Maize | 1.3 | 0.5 | 0.3 | 0.1 |
| 3. Cassava | 4.5 | 0.8 | 0.6 | 0.2 |
| 4. Sweet potato | 2.8 | 1.3 | 1.1 | 0.4 |
| 5. Sugarcane | 0.2 | 0.2 | 0.4 | 0.2 |
| 6. Other crops | 5.4 | 5.7 | 5.5 | 3.7 |
| 7. Livestock | 7.1 | 8.3 | 8.6 | 5.6 |
| 8. Forestry | 1.0 | 0.5 | 0.3 | 0.0 |
| 9. Fishing | 3.1 | 4.6 | 4.5 | 3.1 |
| 10.Mining | 0.2 | 0.2 | 0.3 | 0.3 |
| 11.Rice milling | 28.9 | 17.8 | 18.1 | 6.9 |
| 12.Other food processing | 9.3 | 8.2 | 8.6 | 4.8 |
| 13.Textiles & garments | 2.9 | 3.1 | 3.0 | 2.3 |
| 14.Leather & footwear | 0.5 | 0.6 | 1.4 | 1.3 |
| 15.Wood & paper products | 1.2 | 1.6 | 1.6 | 1.1 |
| 16.Fertilizer | 0.0 | 0.0 | 0.0 | 0.0 |
| 17.Chemicals | 3.0 | 3.0 | 3.0 | 1.9 |
| 18.Cement | 0.0 | 0.0 | 0.0 | 0.0 |
| 19.Metal products | 0.6 | 0.7 | 0.7 | 0.8 |
| 20.Equipment & machinery | 2.7 | 5.9 | 5.7 | 13.5 |
| 21.Other manufacturing | 4.6 | 8.1 | 8.5 | 5.9 |
| 22.Electricity & water | 1.7 | 2.2 | 3.6 | 3.6 |
| 23.Construction | 0.0 | 0.0 | 0.0 | 0.0 |
| 24.Trade & transport | 5.1 | 7.8 | 8.1 | 13.7 |
| 25.Other services | 11.2 | 17.1 | 14.2 | 29.7 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 |

Source: 1997 SAM for Central Viet Nam

percent) and high-income urban households (only 14 percent). Products of agro-processing and labor-intensive industry (sectors 11-15) exhibit a similar pattern of consumption shares among the four household groups: 43 percent for low-income rural, 31-33 percent for high-income rural and low-income urban, and only 16 percent for high-

income urban. The reverse order holds for utilities and services, where high-income urban households show the largest expenditure share (47 percent), low-income rural the smallest (18 percent), and the two other household groups in between (26-27 percent). Finally, the following expenditure shares of equipment & machinery, a highly capital-intensive sector, merit special mention: 2.7 percent for low-income rural households, 5.9 percent for high-income rural, 5.7 percent for low-income urban, and 13.5 percent for high-income urban. These expenditure patterns are consistent with the hypothesis that broadly based agricultural growth in Central Viet Nam will generate a strong demand stimulus to the production of locally produced, labor-intensive goods rather than capital-intensive products from outside the region.

## IV. SAM multiplier analysis

Assuming that some accounts are exogenous – usually the government, capital, and ROW accounts, the algebraic SAM can be transformed into a multi-sectoral model of the economy (national or regional) in which the inter-linkages among sectoral production, household incomes and expenditures, and macroeconomic balances are systematically taken into account. There are 36 endogenous accounts in the Central Viet Nam SAM, comprising 25 commodities, five factors of production, four household groups, and two enterprise accounts.

The total (direct and indirect) effects on the endogenous accounts arising from any given exogenous income injection anywhere in the SAM (due, for example to productivity improvement in a crop sector, or export expansion in a manufacturing sector, or increased government income transfer to low-income households) are transmitted

through the interdependent SAM system, and can be estimated through the multiplier process. In what follows, the SAM multiplier matrix is formally derived and various multiplier measures are defined.

The total income (row sum) in each endogenous account is equal to the sum of products of the expenditure coefficient and corresponding income plus the total exogenous income from the government, ROW, and capital accounts; that is,

$$Y = AY + X \qquad (1)$$

where Y is a column vector (36x1) of total incomes in the 36 endogenous accounts, X is a column vector (36x1) of total exogenous incomes, and A is the expenditure coefficient matrix (36x36) pertaining to the endogenous accounts.

Solving for Y in equation (1) yields

$$Y = (I - A)^{-1} X = M X \qquad (2)$$

where M is the SAM multiplier matrix. Equation (2) can be used to calculate the endogenous incomes associated with any constellation of total exogenous incomes, given M. Also, the effects on Y arising from any given changes in X (e.g., an exogenous income injection in any production sector) can be derived from equation (2)

The magnitude of the SAM multipliers reflects the strength of inter-sectoral linkages in the economy. Each element in the multiplier matrix can be interpreted to indicate the total (direct and indirect) income change in the row-account induced by an exogenous unit-income injection in the column-account. This interpretation is subject to

the familiar limitations of conventional SAM analysis, including the assumptions of purely demand-driven adjustments – in other words, no supply constraints – and of fixed prices and expenditure coefficients.

For each account in the SAM, one can calculate the following aggregate income multiplier measures:

(1) The activity or gross output multiplier, which indicates the total effect on regional gross output of a unit-income increase in a given Account i in the SAM (e.g., a production sector or a household group), is obtained by adding the activity elements in the multiplier matrix along the column for Account i.

(2) The value added or GDP multiplier, giving the total increase in regional GDP resulting from the same unit-income injection, is derived by summing up the factor-payment elements along Account i's column.

(3) The household income multiplier, which shows the total effect on regional household income, is obtained by adding the elements for the four household groups along the column for Account i.

Table 6 contains the calculated values of the gross output, GDP, and household income multipliers for the 25 production sectors in the Central Viet Nam SAM. The gross output multipliers are necessarily greater than one, since the regional value of output will increase by at least the initial income injection to any sector. The effects on regional GDP and total household income, however, can be smaller or greater than one, depending on the strength of inter-sectoral linkages, relative use of factors (vis-a-vis intermediate inputs), and allocation of factor payments to households.

**Table 6: Gross output, value added, and household income multipliers**

| Sector | Gross output | Value added | Household income |
|---|---|---|---|
| 1. Rice | 2.74 | 1.13 | 1.16 |
| 2. Maize | 3.26 | 1.41 | 1.48 |
| 3. Cassava | 3.47 | 1.81 | 1.90 |
| 4. Sweet potato | 3.45 | 1.76 | 1.85 |
| 5. Sugarcane | 2.91 | 1.35 | 1.41 |
| 6. Other crops | 2.69 | 1.18 | 1.21 |
| 7. Livestock | 3.44 | 1.47 | 1.50 |
| 8. Forestry | 3.00 | 1.38 | 1.41 |
| 9. Fishing | 3.19 | 1.31 | 1.31 |
| 10.Mining | 1.67 | 0.47 | 0.37 |
| 11.Rice milling | 3.34 | 1.03 | 1.03 |
| 12.Other food processing | 2.53 | 0.71 | 0.70 |
| 13.Textiles & garments | 1.71 | 0.26 | 0.23 |
| 14.Leather & footwear | 1.58 | 0.25 | 0.24 |
| 15.Wood & paper products | 1.96 | 0.37 | 0.35 |
| 16.Fertilizer | 1.03 | 0.01 | 0.01 |
| 17.Chemicals | 1.14 | 0.05 | 0.05 |
| 18.Cement | 1.88 | 0.44 | 0.33 |
| 19.Metal products | 1.24 | 0.10 | 0.09 |
| 20.Equipment & machinery | 1.03 | 0.01 | 0.01 |
| 21.Other manufacturing | 1.84 | 0.43 | 0.39 |
| 22.Electricity & water | 1.44 | 0.24 | 0.23 |
| 23.Construction | 2.75 | 0.79 | 0.71 |
| 24.Trade & transport | 2.70 | 1.14 | 1.04 |
| 25.Other services | 2.88 | 1.24 | 1.13 |

Source: 1997 SAM for Central Viet Nam

Agricultural sectors clearly have larger multipliers than the mining and manufacturing sectors, based on any of the three multiplier measures. Ranging from 2.69 to 3.45 in terms of gross output, 1.13 to 1.81 in GDP, and 1.16 to 1.90 in household income, the agricultural multipliers are also generally higher than the corresponding multipliers for the services sectors. Cassava, sweet potato, and livestock – which are

largely oriented to the local market – have the largest multipliers, while the heavily traded rice and "other crops" have the lowest, among agricultural sectors. Except for the two agro-processing sectors, manufacturing multipliers are remarkably low in both relative and absolute terms, especially for such large-scale, capital-intensive sectors with high import content as fertilizer, chemicals, and equipment & machinery.

The equity effect can be examined by comparing the values of the income multipliers for the different household groups, which are indicated in the corresponding elements along Account i's column. Since the shares of the four household groups in total household income differ significantly, it is useful to standardize the multipliers by dividing by the respective household-group shares. The calculated income multipliers for each household group associated with each production sector in the Central Viet Nam SAM are given in Table 7. A striking observation is that the agricultural multipliers, and also those for the two agro-processing sectors, are consistently higher for low-income households in both rural and urban areas than those for the two high-income household groups, validating for Central Viet Nam a major assumption of ABD strategy. Thus, the distributional impact of income growth in any of those sectors is positive. The same can be said of the utilities, construction, and services sectors, although their corresponding multipliers are lower than those of agriculture and agro-industry. Mining and "other manufacturing" have relatively larger multipliers for the two urban household groups, indicating an unfavorable equity effect of increasing incomes in these capital-intensive sectors, while the labor-intensive sectors (textiles & garments, leather & footwear, and wood & paper products) are seen to favor the low-income urban households.

**Table 7: Sectoral income multipliers by household group**

| Activities/commodities | Low-income rural | High-income rural | Low-income urban | High-income urban |
|---|---|---|---|---|
| 1. Rice | 1.24 | 1.15 | 1.24 | 1.08 |
| 2. Maize | 1.59 | 1.46 | 1.57 | 1.37 |
| 3. Cassava | 2.06 | 1.88 | 2.04 | 1.75 |
| 4. Sweet potato | 2.00 | 1.83 | 1.97 | 1.71 |
| 5. Sugarcane | 1.52 | 1.39 | 1.50 | 1.30 |
| 6. Other crops | 1.30 | 1.20 | 1.29 | 1.12 |
| 7. Livestock | 1.62 | 1.49 | 1.60 | 1.39 |
| 8. Forestry | 1.51 | 1.39 | 1.50 | 1.31 |
| 9. Fishing | 1.40 | 1.30 | 1.40 | 1.22 |
| 10.Mining | 0.36 | 0.36 | 0.39 | 0.37 |
| 11.Rice milling | 1.10 | 1.02 | 1.10 | 0.97 |
| 12.Other food processing | 0.74 | 0.69 | 0.74 | 0.66 |
| 13.Textiles & garments | 0.24 | 0.23 | 0.25 | 0.23 |
| 14.Leather & footwear | 0.25 | 0.24 | 0.26 | 0.24 |
| 15.Wood & paper products | 0.36 | 0.35 | 0.37 | 0.34 |
| 16.Fertilizer | 0.01 | 0.01 | 0.01 | 0.01 |
| 17.Chemicals | 0.05 | 0.05 | 0.05 | 0.05 |
| 18.Cement | 0.32 | 0.33 | 0.36 | 0.34 |
| 19.Metal products | 0.09 | 0.09 | 0.09 | 0.09 |
| 20.Equipment & machinery | 0.01 | 0.01 | 0.01 | 0.01 |
| 21.Other manufacturing | 0.39 | 0.38 | 0.42 | 0.40 |
| 22.Electricity & water | 0.23 | 0.22 | 0.24 | 0.22 |
| 23.Construction | 0.71 | 0.70 | 0.75 | 0.70 |
| 24.Trade & transport | 1.05 | 1.03 | 1.11 | 1.03 |
| 25.Other services | 1.13 | 1.11 | 1.22 | 1.16 |

Source: 1997 SAM for Central Viet Nam

The SAM framework can also be applied to the analysis – again, focusing on the demand side – of the direct and indirect effects of exogenous income injections to different household groups. The calculated gross output and GDP multipliers for the four household accounts distinguished in the Central Viet Nam SAM are shown in Figures 2 and 3, respectively. It is evident that low-income rural households have the largest

**Figure 2: Gross output multipliers by household group**

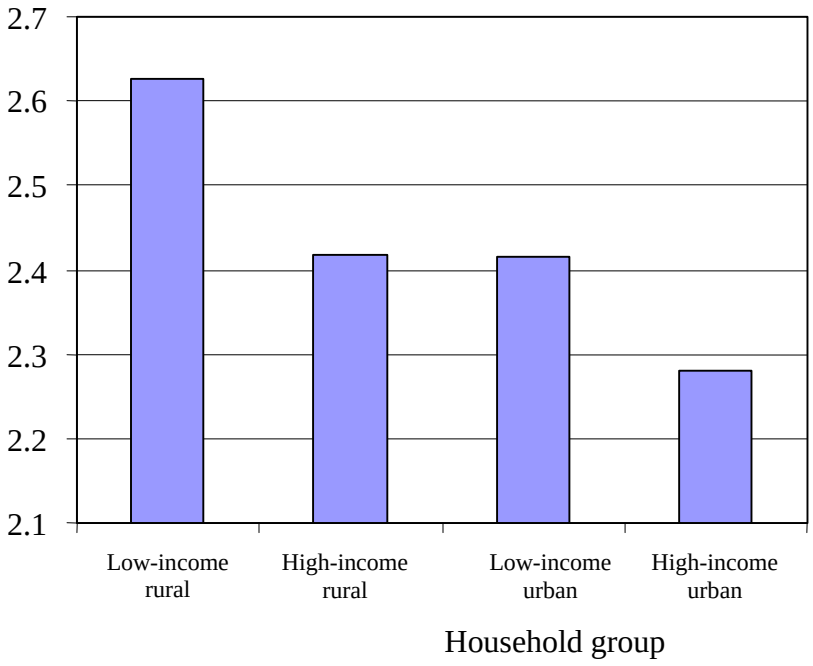
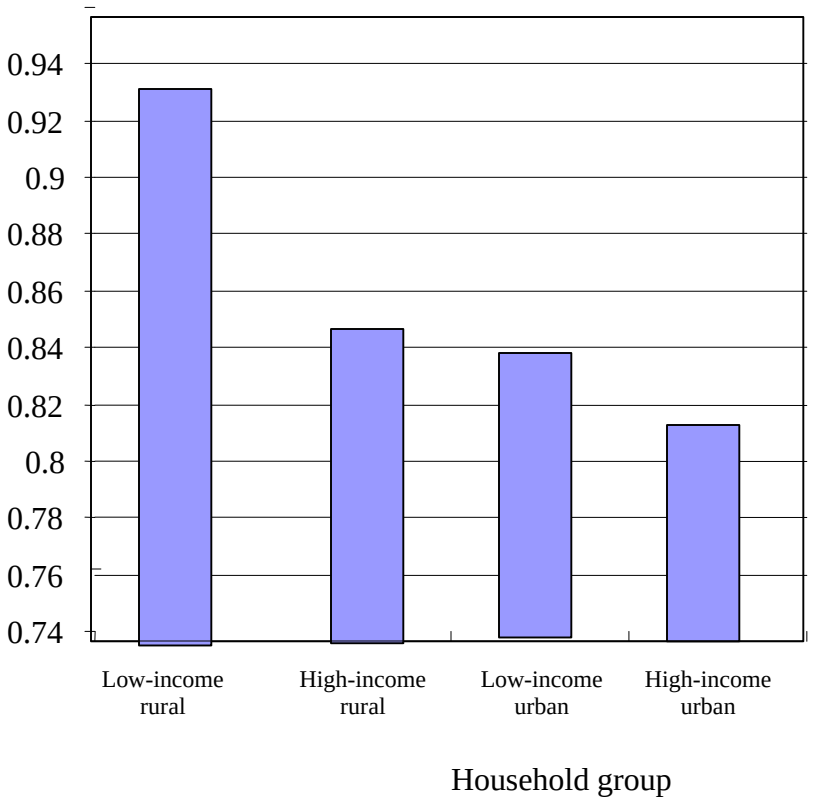



**Figure 3: GDP multipliers by household group**



multiplier – whether in terms of gross output or GDP – among the four household groups. The smallest multipliers are associated with the high-income urban households, while the high-income rural and low-income urban households show nearly equal multipliers. These findings lend support to the hypothesis of a stronger demand stimulus arising from income growth among lower income and rural based households. They also suggest that the distribution of income benefits from agricultural growth in Central Viet Nam is a potentially significant factor in the latter's influence on overall growth of the regional economy.

The increases in sectoral incomes resulting from a unit-income injection to each of the four household accounts in the SAM are given in the multipliers contained in Table 8. The column entries sum up to the gross output multipliers for the corresponding household groups shown in Figure 2 above. From the first column of Table 8, an income expansion of 1 million dongs for low-income rural households leads to increases of 892 thousand dongs in total agricultural income (i.e., for sectors 1-9) and of 716 thousand dongs in total income in the agro-processing and labor-intensive industries (sectors 11-15). With the high-income urban household group, the corresponding results are much lower income gains of 562 thousand dongs for agriculture and 456 thousand dongs for agro-processing and light industry. Reflecting the consumption expenditure patterns described earlier (see Table 5), larger income benefits will accrue to the utilities and services sectors, as well as to equipment & machinery, from income increases among high-income urban households relative to the three other household groups.

**Table 8: Household income multipliers by sector**

| Activities/commodities | Low-income rural | High-income rural | Low-income urban | High-income urban |
|---|---|---|---|---|
| 1. Rice | 0.364 | 0.270 | 0.281 | 0.194 |
| 2. Maize | 0.019 | 0.011 | 0.010 | 0.007 |
| 3. Cassava | 0.058 | 0.022 | 0.025 | 0.017 |
| 4. Sweet potato | 0.041 | 0.025 | 0.025 | 0.017 |
| 5. Sugarcane | 0.031 | 0.028 | 0.031 | 0.023 |
| 6. Other crops | 0.143 | 0.138 | 0.137 | 0.111 |
| 7. Livestock | 0.129 | 0.131 | 0.130 | 0.106 |
| 8. Forestry | 0.025 | 0.020 | 0.019 | 0.015 |
| 9. Fishing | 0.082 | 0.091 | 0.088 | 0.072 |
| 10.Mining | 0.010 | 0.010 | 0.011 | 0.011 |
| 11.Rice milling | 0.411 | 0.298 | 0.312 | 0.210 |
| 12.Other food processing | 0.183 | 0.166 | 0.177 | 0.130 |
| 13.Textiles & garments | 0.065 | 0.063 | 0.062 | 0.055 |
| 14.Leather & footwear | 0.011 | 0.011 | 0.016 | 0.017 |
| 15.Wood & paper products | 0.046 | 0.049 | 0.047 | 0.044 |
| 16.Fertilizer | 0.058 | 0.045 | 0.046 | 0.034 |
| 17.Chemicals | 0.073 | 0.071 | 0.070 | 0.061 |
| 18.Cement | 0.004 | 0.004 | 0.004 | 0.005 |
| 19.Metal products | 0.026 | 0.027 | 0.027 | 0.027 |
| 20.Equipment & machinery | 0.117 | 0.139 | 0.132 | 0.200 |
| 21.Other manufacturing | 0.121 | 0.145 | 0.141 | 0.128 |
| 22.Electricity & water | 0.084 | 0.088 | 0.095 | 0.101 |
| 23.Construction | 0.005 | 0.005 | 0.005 | 0.006 |
| 24.Trade & transport | 0.208 | 0.215 | 0.212 | 0.251 |
| 25.Other services | 0.313 | 0.344 | 0.313 | 0.438 |
| Total | 2.626 | 2.418 | 2.416 | 2.281 |

Source: 1997 SAM for Central Viet Nam

These results, together with the earlier findings on the comparative sectoral multipliers by household group, indicate that the linkage effects of income growth in less affluent and rural-based households on the one hand and in agriculture, agro-processing, and labor-intensive industry on the other are mutually reinforcing. This linkage

mechanism provides a strong socio-economic rationale for improving productivity in those sectors of the Central Region economy.

## V. Some policy implications

The results of SAM-based analysis presented above indicate relatively strong macro-linkages of agricultural growth in Central Viet Nam leading to favorable outcomes n overall income growth and equity. They also provide empirical support to the adoption of an agriculture-based development strategy that can encourage labor-intensive and geographically dispersed industrialization in the Central Region. Such development strategy will require a reorientation of government policies toward the immediate objective of improving agricultural productivity on a broad front. The associated growth of rural incomes is expected to generate a significant demand stimulus for locally produced labor-intensive industrial goods, agro-processed products, and services. Therefore, it will be necessary under the ABD strategy to ensure a strong supply response from domestic producers of those goods and services. This will warrant active support for private-sector development, directed particularly to rural-based, small- and medium-scale enterprises (SMEs) which are inherently labor-intensive and make significant use of indigenous materials.

The promotion of agricultural growth in Central Viet Nam can be helped significantly by improving the country's macroeconomic and trade policies which to date discriminate against agriculture. In the first place, the heavy protection of domestic industry directly lowers the effective protection and relative price of agricultural products. In fact, Viet Nam's protectionist trade policy is focused on import-substituting

industries that are mostly large-scale and capital-intensive (e.g., petroleum, glass, steel, cement, and fertilizer). Thus, not only does it hinder agricultural growth, the relative price effect of such trade restrictions also acts – through higher intermediate input costs – as a tax on labor-intensive manufacturing, the production sector that needs to respond to the demand stimulus generated by increasing rural incomes under the ABD strategy.

An additional source of price bias and hence a disincentive to farm production attributable to the restrictive trade regime is the indirect effect arising from the induced overvaluation of the real exchange rate (RER). An overvalued RER artificially reduces the price of tradable goods relative to nontradables. The distinction between tradable and nontradable products is based on whether their domestic prices are significantly affected by foreign prices, even if they may not actually be traded. Most agricultural products are tradable since foreign prices are a major influence on their domestic prices. By contrast, many products of the "industry" sector (which includes the construction and utilities sub-sectors) and most products of "services" are nontradable. Because the agricultural share in GDP is higher in Central Viet Nam than in the whole country while the shares of the industrial and service sectors are relatively lower in the region, the price disincentive for agricultural producers in the Central Region from real exchange rate overvaluation has been on average greater than in the rest of Viet Nam. Thus, the Central Region economy will likely gain more from an improvement in trade and macroeconomic policies that reduces the degree of real exchange rate overvaluation in Viet Nam.

The massive devaluation of East Asian currencies in recent years has not been matched by the Vietnamese dong, which is an important reason Viet Nam has not kept up with the gains in international competitiveness of other economies in the region (World

Bank 1998). Greater exchange rate flexibility is needed in Viet Nam at this time so as to offset the recent appreciation of the real exchange rate. Jointly with trade policy liberalization, it can ensure that the price competitiveness of Vietnamese tradable goods is not undermined in domestic and world markets. Macroeconomic policy makers should be concerned not only with nominal exchange rate changes but also with the differential inflation rates between Viet Nam and its trading partners.

Last, but not least, there is an urgent need to end the preferential treatment of state-owned enterprises over private enterprises in many areas of the Vietnamese economy. Trade policy reform will eventually remove the advantaged position of SOEs in the allocation of lucrative export and import quotas as well as in the heavy protection of SOE products by the existing trade regime. However, more favorable treatment is also being accorded SOEs in access to land rights and in the use of land, and also in access to low-interest institutional credit. Private enterprises, including SMEs, should be allowed to compete on equal basis with SOEs. Under the ABD strategy, as well as in the subsequent stage of industrial export-oriented development, rapid expansion of SMEs is a key ingredient in the promotion of equitable growth in Central Viet Nam.

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