**The Impact of the Global Commodity and Financial Crises on Poverty in Vietnam**

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**Summary –** Economic growth in Vietnam has been fairly resilient to the global commodity and financial crises, but it is unclear why. In addition, the impact of the crises on employment and poverty is in dispute. We develop a dynamic computable general equilibrium model to decompose impacts and estimate distributional outcomes. Our results indicate that the 2008 commodity crisis increased employment and reduced poverty by favoring labor-intensive exports, especially in agriculture. The 2009 financial crisis reversed these gains. It pushed more than a million workers into unemployment and about 3 million people below the US$2-a-day poverty line, with the vast majority of these being rural dwellers. The net effect of the crises left Vietnam little changed from a baseline (no crises) path in terms of aggregate indicators including the poverty rate. An effective stimulus package has the potential to offset one third of the increase in poverty caused by the financial crisis leaving poverty rates below the (no crises) baseline.

*Key words* – economic crisis, growth, poverty, Vietnam

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**The Global Commodity and Financial Crises and Their Impact on Poverty in Vietnam**

**1. INTRODUCTION**

Vietnam's economy has grown rapidly over the last two decades, and poverty has declined without a significant deterioration in inequality (Glewwe et al., 2002; GSO, 2007). Agriculture played a key role in this process. Large parts of the sector were transformed from subsistence to export-orientation and Vietnam became a major exporter of grains and other foods. During the 2008 commodity crisis, world prices for Vietnam’s major exports rose rapidly, but during the 2009 financial crisis and subsequent global recession there was a sharp decline in world prices, demand for exports, and foreign investment. Economic growth in Vietnam slowed in early 2009, but the economy continued to expand and there were clear signs of recovery during the second half of the year. This suggests that, from a macroeconomic perspective, Vietnam has so far weathered the two crises fairly well.

It is uncertain, however, what the effect of the crises has been on workers and households and what the lasting welfare implications will be. Industrial workers were laid off in early 2009, possibly resulting in migration back to rural areas (Van, 2009), but it is unclear to what extent agriculture and the rural nonfarm economy cushioned the incomes of displaced workers and their households. Moreover, Vietnam’s government responded to the financial crisis by introducing a stimulus package aimed at stabilizing capital markets, encouraging domestic investment and extending social security. The extent to which these measures might offset growth and welfare losses is the subject of debate.

Given the uncertainty surrounding household-level outcomes, we estimate the impact of the commodity and financial crises on growth, employment and poverty. We also assess the government's stimulus package. Section 2 describes Vietnam’s economy and its growth performance during the crises. Section 3 considers the impact channels through which economic growth may have been affected. To translate macro-level impacts into household incomes and poverty we develop a dynamic computable general equilibrium (DCGE) model described in Section 4. Section 5 discusses the simulations and results, and the final section concludes.

**2. VIETNAM’S ECONOMIC PERFORMANCE DURING THE CRISES**

*Structure of the Vietnamese economy*

Total gross domestic product (GDP) was US$61.3 billion in 2007, equivalent to US$743 per capita for Vietnam’s 82.5 million people.[[1]](#footnote-1) Industry generates two-fifths of total GDP and one-fifth of employment, two-thirds of which is in manufacturing (Table 1). Industrial goods also generate a major share of Vietnam’s export earnings due to large contributions from textile and clothing (25.8%), agro-processing (12.5%), and metals and machinery (11.9%). Oil has also contributed significantly (19.0%). Vietnam is equally dependent on industrial imports, particularly metals and machinery (38.5%), fuel and chemicals (22.5%), and textiles (15.3%).

[Table 1: Vietnam's economic structure]

Agriculture is another key sector, generating one-fifth of total GDP and employing half the country’s workforce. Crops dominate, with paddy rice alone accounting for 6.8% of total GDP. Seafood and traditional crops, such as rubber and coffee, have strong downstream linkages to manufacturing, where raw agricultural products are processed and often exported. Agriculture in Vietnam is more export-oriented than in most developing countries, with agriculture and agro-processing together generating one-fifth of all export earnings. Moreover, 10% of agricultural investment is FDI (GSO, 2009a). Agriculture in Vietnam thus has relatively strong ties to global market conditions.

Agriculture’s importance extends beyond its contribution to GDP, employment and export earnings. Three quarters of Vietnam’s population live in rural areas, where most derive some farm income. Poverty is also much higher in rural areas. According to the 2006 Vietnam Household Living Standard Survey (VHLSS), 47% of Vietnam’s population lives below the US$2-a-day poverty line (GSO, 2007). Yet equivalent rural and urban poverty rates are 59% and 15% respectively, implying that about 90% of the poor population is in rural areas. Moreover, poorer urban households spend half of their incomes on food. Agriculture therefore plays a crucial role in households’ livelihoods, especially for the poor.

*Economic growth during the crises*

Vietnam’s real economy expanded at an average 7.5% per year during 2000-2007 (Figure 1). Growth in total GDP decelerated slightly during the 2008 commodity crisis driven by a small slowdown in services and a larger decline in industry. Falling industrial growth was due to construction, whose annualized growth rate dropped from 12% to 0%. Agricultural growth, by contrast, rose from 3% to 4% due to expanded crop and aquaculture production (GSO, 2009b). Vietnam’s overall performance during the 2008 commodity crisis was thus characterized by stronger agricultural growth and continued industrial growth outside of construction.

[Figure 1: Economic growth by major sector]

Economic growth slowed sharply in the first quarter of 2009, which marks the height of the financial crisis and the onset of the global recession. Industry’s deceleration was almost exclusively due to manufacturing, with firms temporarily closing factories and dismissing workers (Van, 2009). The financial crisis also marked a reversal for agriculture. Crop production growth slowed from 5.7% during the first half of 2008 to 0.7% in 2009 (GSO, 2009b). The decline was even more pronounced for aquaculture, whose annualized growth rate fell from 30% to 2%. Although rice and seafood were affected by lower export demand, at least some of their poor performance in early 2009 was due to adverse weather conditions. The slight slowdown in services resulted from weakened foreign tourism.[[2]](#footnote-2) Ultimately, only transport and construction grew robustly during the 2009 financial crisis with all other sectors either stagnating or contracting. However, during the second half of 2009 agriculture and industry have shown signs of recovery, suggesting that the negative growth-effects of the financial crisis may be fairly short-lived.

**3. GROWTH AND POVERTY IMPACT CHANNELS**

This section examines the apparent resilience of national GDP growth to the two crises, considering various impact channels, including the financial sector; foreign direct investment; world prices and trade; and the government’s stimulus package. We also identify various channels linking the macro-level impacts of the crises to household incomes and poverty.

*Financial sector and monetary policy*

Vietnam’s financial sector has been fairly insulated from the financial crisis. Andersen et al. (2008) identify three sources of potential financial instability in developing countries resulting from the financial crisis: (i) exposure to illiquid/downgraded assets in developed countries; (ii) presence of foreign-owned domestic banks; and (iii) liquidity constraints from a shortage of short-term capital in international money markets. None of these have been present in Vietnam.

First, the country has limited direct exposure to the “toxic assets” that undermined many Western financial institutions. Vietnam’s banks are generally well capitalized with limited reliance on credit lines to Western banks (i.e., low balance sheet exposure). Nevertheless, asset prices, and in particular stocks, are highly sensitive to market sentiment and the external environment. The stock-market therefore plummeted in late 2008 and early 2009.

Secondly, despite the rising market shares of joint-stock commercial banks, most banking assets remain on the balance sheets of five state-owned banks. This limited exposure to troubled foreign-owned banks and provided the government with a mechanism for controlling credit rates, which proved to be a key instrument in its stimulus package. The state-supported Vietnam Bank for Social Policy (VBSP) also provided a means of efficiently disbursing government-subsidized loans to rural communities.

Finally, the tightening of monetary policy in mid-2008 to cool the economy was reversed in late-2008 due to the financial crisis. Monetary policy remained loose, with government interest rate subsidies expanding credit and money supply during 2009. Overall, total liquidity (measured by M2) rose by 35% in the first half of 2009. The supply of short-term capital was therefore expanded and the impact of the crisis on the financial sector has remained small.

*Foreign direct investment*

One motivation for tightening monetary policy in 2008 was the high levels of inflation caused in part by large surges in FDI (Figure 2). The financial crisis caused a sharp contraction in global capital markets in late-2008, including foreign capital inflows to Vietnam. By early-2009, FDI had fallen below 2007 levels. This slowdown in investment helped stabilize consumer prices, with inflation returning to pre-2007 trends. Thus, a positive outcome of the financial crisis was that it cooled the overheating Vietnamese economy.

[Figure 2: FDI and consumer prices]

To isolate the effects of the financial crisis on FDI, we compare flows in late-2008 with those in late-2007, treating the spike in FDI in 2008 as independent of the two crises. This comparison suggests that almost all of the reduction in FDI caused by the financial crisis occurred in the industrial sectors, with manufacturing being the worst affected (GSO, 2009b). FDI in agriculture and downstream agro-processing also declined, although these were among the least affected sectors. By contrast, FDI in the transport sector rose during the crisis, possibly explaining its continued growth while other sectors declined (Section 2). Using 2007 trends as a baseline and excluding the transport sector, FDI inflows to Vietnam were more than 20% below what they would have been had the financial crisis not occurred. The decline in FDI has implications for growth in both contemporaneous and future periods.

*World commodity prices and foreign trade*

World commodity prices rose rapidly in late-2007 and peaked in mid-2008 (Figure 3). Food and energy prices rose especially fast, with the largest increases recorded for rice and crude oil. Both of these commodities are major exports for Vietnam, generating a quarter of export earnings. Smaller price increases were recorded for major imports, such as metals and machinery. Overall, the 2008 commodity crisis improved Vietnam's terms-of-trade. However, rising prices generated worldwide concern for food security, and prompted Vietnam to ban incremental rice exports during the first half of 2008. In other words, planned exports were permitted to continue (and to reap the terms of trade gain). However, agents were prevented from increasing export levels thus preventing reallocation of domestic supplies to exports in response to higher world prices.

[Figure 3: World prices]

The financial crisis and subsequent global recession caused world prices to fall rapidly to levels similar to those of 2007. Crude oil prices initially declined below 2007 levels, thus having a detrimental effect on Vietnam’s terms-of-trade, but prices had returned to 2007 levels by late-2009. Moreover, food prices remained similar to or even above 2007 levels throughout the financial crisis. By contrast, metals and minerals prices fell below 2007 levels and their rebound by late-2009 remained fairly modest. This suggests that Vietnam’s import prices may have fallen by more than export prices during the financial crisis. It also underlines the divergent effects of the commodity and financial crises.

Changes in world prices reflect shifts in global demand. Vietnam is a very open economy and, as such, is vulnerable to falling export demand. Merchandise exports fell during the first quarter of 2009 relative to the quarterly average for 2008. Most of this decline was driven by agriculture, food and textiles, where exports fell by about 40%. Crude oil exports remained relatively stable, albeit below peak 2008 values. Moreover, some export sectors expanded during the crisis, most notably high-value minerals. Ultimately, while the value of most export products declined during the financial crisis, by mid-2009 they had again surpassed 2007 levels. This may reflect price-inelastic demand for many of Vietnam’s exported products, such as grains and low-value clothing.

[Table 2: Trade values]

There were also substantial declines in import demand, which almost halved during the first quarter of 2009. This was driven by falling FDI, which is highly import-intensive and accounted for about 40% of merchandise imports in 2008 (GSO, 2009a). Lower inflation and some depreciation of the nominal exchange rate also helped reduce import demand (Figure 2). Ultimately, imports declined by more than exports pushing the trade balance into surplus in the first three months of 2009. This raised national GDP and offset declining foreign investment. The strong links between FDI and imports reduces the risks typically associated with current account deficits. While the decline in FDI clearly translated into reduced investment and hence reduced future growth, it also eliminated the current account deficit thus obviating the frequently experienced need to restructure the economy to produce more tradables and fewer nontradables when a principal source of foreign exchange declines. This automatic stabilization mechanism explains some of the resilience of Vietnam's economic performance during the financial crisis.

*Government stimulus package*

As in many countries, Vietnam’s government put in place a stimulus package in early-2009 to bolster investment and private consumption during the financial crisis. The International Monetary Fund estimated that Vietnam’s proposed stimulus package was worth US$4billion, although the official budget was US$8.6million (Table 3). A large component of the stimulus package was a 4% interest rate subsidy, which is estimated to have generated US$24.1billion in additional lending. About 68% of these subsidies went to private businesses and 17% to households. The intended impact of the stimulus package was to offset some of the declines in foreign investment, and may explain the strong growth in construction from mid-2009 onwards.

[Table 3: Stimulus package]

The largest component of the stimulus package is ‘advanced capital’, which brings forward planned investments from future budgets. The government announced that half of the funds would be devoted to transport infrastructure and the rest would be divided evenly between agriculture and small businesses. It is unclear how much of these funds were actually disbursed, but the government announced in late-2009 that it would implement a US$3.3billion stimulus package targeting agriculture and rural development. Most of these funds have been allocated to infrastructure, including irrigation, grain storage and farm machinery. Finally, in its original stimulus package the government directly targeted households via tax relief and social transfers.

*Household consumption*

To date, no firm quantitative evidence exists which can gauge the effects of the crises on private consumption. However, there are a range of impact channels that should be considered. The first channel is via *domestic prices*. The effect of world price changes depends on the degree of price transmission and the composition of households’ incomes and expenditures. Some empirical studies indicate that international to domestic price transmission is high in Vietnam (Rapsomanikis and Sarris, 2007). This is potentially important for food products, which comprise 47% and 33% of rural and urban households’ consumption baskets respectively (Arndt et al., 2009). Food is also a larger consumption item for low-income consumers, implying that changes in world food prices could have significant implications for poverty. However, households, especially the poor in rural areas, often produce their own food. Indeed, home production accounts for about a third of total consumption in Vietnam. World price impacts will be substantially smaller for those households that produce a large share of their own consumer goods, and the degree of price transmission remains subject to debate (Abbott et. al, 2009).

The second channel is via *employment and wages*. Although national GDP did not fall in 2008-2009, there were larger adjustments at the firm-level. Vietnam’s government estimates that 80,000 jobs were lost in the early stages of the financial crisis and that the total job losses may be as high as 400,000 (cited in Van 2008). Many factories ceased production in early-2009 causing unemployment rates to rise. Moreover, the government suggests that a million workers were ‘affected’ by the crisis, meaning that workers who retained their jobs earn lower wages. Thus, the impact of the crisis on employment and wages depends on shifts in firms’ profitability and labor demand.

The final impact channel is *taxes and transfers*. Vietnamese households received US$3.5 billion in foreign transfers in 2007. This was US$44 per capita or 7.3% of total household income. Projections indicate that remittances fell by 8% in 2009 (World Bank, 2009c). This may not directly affect poverty, however, since higher-income households receive most remittances. For instance, transfers from abroad generated 15% of incomes for households in the top income quintile in 2007, but less than 2% of incomes for the bottom three quintiles (Arndt et al., 2009). Moreover, some households will benefit from new social transfers in the government's stimulus package. Existing social transfers averaged US$27 per capita in 2007 and were biased towards urban households in the middle of the income distribution.

In summary, this section has suggested why national GDP growth in Vietnam did not collapse during the two crises. The 2008 commodity crisis improved terms-of-trade, especially for agriculture, prior to policy intervention. Evidence also indicates that falling FDI during the 2009 financial crisis was associated with a dramatic decline in imports and was further offset by the government's stimulus package. Throughout the crisis, the financial sector remained insulated from disruptions in developed countries’ financial systems. However, there is so far little quantitative evidence on the distributional impacts on private consumption or welfare effects on different population groups.

**4. ECONOMY-WIDE MODELING FRAMEWORK**

*A core general equilibrium model*

Table 4 presents the equations of a simple DCGE model illustrating how changes in world prices and foreign capital inflows affect employment and household incomes. Producers of each commodity *c* produce a level of output *Q* by employing the factors of production *F* under constant returns to scale (exogenous productivity *α*) and fixed production technologies (fixed factor input shares *δ*) (eq. [1]). Profit maximization implies that factor payments *W* are equal to average production revenues (eq. [2]). Total labor, land and capital supply *s* are fixed, implying full employment and inter-sector mobility (eq. [10]). This means that declining farm/factory production causes factor demand to fall, which in turn lowers economy-wide factor returns and affects production in other sectors.

[Table 4: Model equations]

Foreign trade is determined by comparing domestic and world prices, where the latter are fixed under a small country assumption. The simple model implements trade as a complementarity problem. If domestic prices exceed world import prices *wm* (adjusted by exchange rate *E*) then the quantity of imports *M* increases (eq. [3]). Conversely, if domestic prices fall below world export prices *we* then export demand *X* increases (eq. [4]). To ensure macroeconomic consistency, a flexible real exchange rate adjusts to maintain a fixed current account balance *b* (measured in foreign currency units) (eq. [8]). This means that falling world prices reduces exports and causes the real exchange rate to depreciate in order to enhance other export producers' competitiveness and reduce overall import demand. Similarly, reducing FDI inflows (i.e., lowering *b*) causes the real exchange rate to depreciate.

Factor incomes are distributed to households using fixed income shares θ based on households’ initial factor endowments and are combined foreign remittances *r* adjusted by the exchange rate (eq. [5]). Incomes *Y* are then saved (based on marginal propensities to save *υ*) or spent on consumption *C* (according to marginal budget shares β) (eq. [6]). Household savings and foreign capital inflows are collected in a national savings pool from which investment demand *I* is financed (i.e., a savings-driven investment closure) (eq. [7]). Finally, prices *P* equilibrate product markets such that demand for each commodity equals supply (eq. [8]). The model therefore links production and trade to household incomes via changes in market prices, employment and factor returns.

The model’s variables and parameters are calibrated to empirical data from a social accounting matrix that captures the initial structure of Vietnam's economy in 2007 (see Arndt et al., 2009). Parameters are then adjusted over time to reflect demographic and economic trends and the model is re-solved for a new equilibrium each half-year during 2007-2011. Between periods the model is updated to reflect exogenous rates of land and labor expansion φ (eq. [11]). The rate of capital accumulation is determined endogenously, with previous period investment converted into new capital stocks using a fixed capital price κ (eq. [12]). This is added to previous capital stocks after applying a depreciation rate π. Finally, the model captures total factor productivity (TFP) through the production function’s shift parameter α, with the rate of technical change γ determined exogenously.

*Extensions to the full Vietnam model*

The above model illustrates how production, trade and household incomes are linked in our analysis. However, the full model drops some of the core model's more restrictive assumptions (see Lofgren et al., 2002; Thurlow, 2005). Constant elasticity of substitution production functions allow factor substitution based on relative factor prices (i.e., δ is no longer fixed). The model identifies 66 sectors (26 agriculture, 22 industry and 10 services). Intermediate demand in each sector, which was excluded in the core model, is now determined by fixed technology coefficients (i.e., Leontief demand).

Based on VHLSS 2006, labor markets are segmented across rural/urban areas and four education groups: (1) below primary schooling; (2) completed primary; (3) completed secondary; and (4) tertiary. Agriculture-specific factors include crop land, livestock, and fisheries stocks. All workers have upward-sloping supply curves implying a binding reservation wage.[[3]](#footnote-3) Agricultural factors are fully employed and earn flexible returns. Capital is immobile and new capital is allocated across sectors based on profit rate differentials under a ‘putty-clay’ specification. This means that once capital is invested it cannot be used for other purposes. When annual profit rates on fixed capital fall by more than 20% we assume that capital utilization declines. Unused capital continues to depreciate but is reactivated once profit rates improve. This specification of capital underutilization permits temporary rises in unemployment during the crises while retaining the producers' capacity to expand production under better market conditions.

International trade is captured by allowing production and consumption to shift imperfectly between domestic and foreign markets, depending on the relative prices of imports, exports and domestic goods (inclusive of indirect taxes). This differs from the core model, which assumed perfect substitution between domestic and foreign goods (i.e., homogenous products). This extension captures differences in domestic and foreign products and allows for observed two-way trade. Vietnam is still considered a small economy (i.e., world prices are fixed). Vietnam’s real exchange rate (i.e., price index of tradable-to-non-tradable goods) adjusts to maintain a constant current account balance. Production and trade elasticities are drawn from Dimaranan (2006).

Households maximize a Stone-Geary utility function so that a linear expenditure system determines consumption with non-unitary income elasticities.[[4]](#footnote-4) Households are disaggregated across rural and urban areas and by per capita expenditure quintiles, giving a total of 10 representative households in the DCGE model. Households pay taxes to the government based on fixed direct and indirect tax rates. Tax revenues finance exogenous recurrent spending, resulting in an endogenous fiscal deficit. Finally, the analysis includes a separate micro-simulation module. In the module, each respondent in VHLSS is linked to their corresponding representative household group in the DCGE model. Changes in commodity prices and households’ consumption spending are passed down from the DCGE model to the micro-simulation module. Total per capita consumption and poverty measures are then recalculated assuming Leontief preferences by individual households.

**5. MODEL SIMULATIONS AND RESULTS**

*Baseline scenario*

The DCGE model is initially calibrated to track observed trends in key demographic and macroeconomic indicators. Annual labor force growth of about 2.5% is targeted during 2007-2011 (World Bank, 2009). Higher-educated labor grows faster than other labor types reflecting improvements in human capital stocks. For example, based on recent surveys, the supply of workers with tertiary schooling expands at 6.5% per year, while the supply of workers with only primary schooling grows at 2.3% (GSO, 2009b). Technical change is also biased towards higher-educated labor, and is consistent with the negligible deviations in relative wages observed since 2000.

Biased technical change favors skill-intensive sectors. Accordingly, total GDP growth of about 7.5% per year in the Baseline scenario is driven by industry and services, which grow at about 8.5% during 2007-2011. Agriculture grows at a slower 3% per year. The national US$2-a-day poverty headcount rate declines from 47.3% in 2007 to 42.2% by 2011. Although poverty declines in both rural and urban areas, slower agricultural growth results in slightly smaller reductions for rural households. A comparison with observed trends for 2005-2007 suggests that this baseline adequately captures Vietnam's growth path prior to the commodity and financial crises. The Baseline scenario thus provides a reasonable counterfactual against which we can measure the impacts of the crises.

*Simulating the commodity and financial crises*

Section 3 identified impact channels linking the crises to economic growth. Here we describe the shocks imposed on the DCGE model. In the first simulation, we estimate the impact of the 2008 commodity crisis. Detailed world prices were taken from World Bank (2009b). The real price changes imposed on the model are shown in Table 5 for Vietnam's main traded commodities. In the commodity crisis scenario, we only impose the price changes that took place during 2008 (i.e., the first two columns) so this is referred to as the "food/fuel" simulation.

[Table 5: Shock parameters]

In assessing the 2009 financial crisis, we take the results from the “food/fuel” simulation as our starting point (e.g., end 2008). We then incrementally include the changes in world prices, foreign investment and foreign remittances. In addition, rates of productivity growth are changed in order to track the GDP and trade changes described in Table 2. Changes in world prices during 2009 are shown in the final two columns of Table 5. These are imposed on the model in the "2009 prices" simulation. In the "FDI outflows" simulation we include both declining world prices and FDI flows. FDI falls by 15% in the first and second halves of 2009, which is a cumulative decline of about 25% for the year. Finally, in the "Remittances" simulation we reduce foreign transfers to households by about 10% based on projections from World Bank (2009c). Absolute declines in transfers are distributed proportionally across rural/urban households according to remittance receipts reported in VHLSS. The "Remittances" scenario captures all three impact channels from Section 3 and thus reflects the overall impact of the 2009 financial crisis.

Finally, we simulate the government’s stimulus package. First, interest support and advanced capital offset declining FDI by injecting foreign reserves into the private sector. These are modeled as a US$1.45 billion increase in external funds transferred to the real economy.[[5]](#footnote-5) Secondly, we simulate a 3% or US$300 million increase in recurrent government spending which raises agriculture's productivity by 6%.[[6]](#footnote-6) Third, we proportionally reduce direct tax rates on enterprises and households by about 12% (not percentage points) and extend social transfers by US$10 per capita. The cost of these interventions is US$900 million and US$850 million respectively. Finally, the stimulus is assumed to eliminate about a quarter of the productivity growth losses incurred during the financial crisis. The overall stimulus package simulated in the DCGE model costs US$3.5 billion or 5% of GDP in 2008. The “stimulus” simulation captures key elements of the proposed 2009 stimulus package and is of similar magnitude.

*Impact of the 2008 food and fuel price crisis*

Table 6 presents the results for the food/fuel scenario, which captures the changes in commodity prices during 2008. Although price changes are modeled on a semester basis (i.e., half yearly), the table reports total impacts for 2008. As such, since the ban on additional rice exports was only imposed during the first half of 2008, the table reflects post-ban outcomes when world price changes had been transmitted to the domestic economy. As indicated earlier, Vietnam's terms of trade improved in 2008, because weighted export prices rose by more than import prices. This was primarily due to rice and crude oil, which are major export commodities whose prices rose significantly (see Table 5). Recall that the export ban applied only to incremental exports of rice. Existing rice exports benefited from higher prices even when the ban was in place. In addition, the ban was not in place in the second half of 2008. The improvement in the terms of trade generates an appreciation of the real exchange rate, reflected in a reduced price of tradeable to nontradeable commodities. The Vietnamese economy responds by reducing total exports, which fall by 1% in volume terms below the baseline. Even though world import prices are rising, this is more than offset by the real appreciation and there is a slight increase in import volumes.

[Insert Table 6]

The rapid onset of the 2008 commodity crisis constrained producers' ability to respond to new external market conditions. This is captured in the model by fixing capital stock and land allocations and limiting labor substitution possibilities. There is still, however, a shift in resources towards commodities whose export profitability rises the most. Crop production, for example, expands by an additional 1.9% as rice farmers eventually take advantage of higher export prices. This increases rural employment, mainly for lower-skilled farm workers. Conversely, manufacturing and services production falls, because the large real appreciation reduces their export competitiveness. Urban employment also declines as a result. Overall, the shift out of non-agriculture into lower productivity crop production causes real GDP to decline slightly by 0.2%. These results are consistent with the observed rise in agricultural GDP and decline in the growth of services GDP during 2008.

Although economic growth declines slightly, there is still an increase in total absorption due to the terms of trade improvement. However, not all components of absorption are affected equally. Since recurrent government spending is constant in the model, tax revenues from oil exports are used to expand public investment. Overall, total investment demand rises by 0.8% relative to the baseline. The increase in investment also benefits from cheaper imported machinery and accounts for the expansion of construction (included in "other industry"). Falling consumer prices, caused by cheaper imported goods and higher food production, also causes real private consumption to expand by 1.5%. Since absorption is an aggregate measure of welfare in the economy, the results suggest that the global commodity crisis had a positive effect on welfare in Vietnam.

The net employment-effects of the 2008 commodity crisis were also positive. At the national-level, employment increased by 0.9% or about 350,000 jobs. Most of these new jobs are created in the agricultural sector, which explains why the rural poverty headcount declines by five percentage points.[[7]](#footnote-7) Overall, the commodity crisis reduced the number of people in Vietnam living below the US$2-a-day poverty line by 3.1 million people. As shown in Figure 4, the poverty reduction only occurs after the lifting of the rice export ban. This is because the ban limited the increase in producer prices and hence many of the gains for rural farmers. Lifting of the ban during the second half of 2008 allowed domestic prices to adjust to higher world prices and for rural farmers to increase rice production, causing poverty to decline. Overall, this is a substantial decline in national poverty beyond what would have been expected without the positive terms-of-trade effects caused by the global commodity crisis.

[Insert Figure 4]

*The 2009 financial crisis and global recession*

Table 7 shows how the impact of the financial crisis is decomposed into falling world prices, FDI and remittances. Productivity growth is also reduced in order to track GDP and trade impacts. As indicated, simulations of the financial crisis are cumulative such that the remittances column reflects the full impact of the crisis in 2009 without any mitigating government stimulus and the final column indicates the effect assuming that the proposed stimulus package is fully enacted. The first two columns of results, labeled food/fuel scenario, show annual growth rates for 2009 assuming the high world prices prevailing in 2008 had continued into 2009. The remaining columns present contemporaneous percentage point differences from this food/fuel crisis scenario.

[Insert Table 7]

We first focus on changes in world prices (see the third column of Table 7). Falling world prices in 2009 improved Vietnam's terms-of-trade even beyond the levels achieved in 2008. Based on 2007 trade shares, trade-weighted import prices fell faster than export prices. Note that import prices receive a larger weight in the terms-of-trade calculation due to Vietnam's trade deficit. The decline in the import price index is driven principally by falling prices for imported intermediates, such as metals, fuels, and textiles. The falling prices for imported investment goods, such as machinery and transport equipment, also reduces the import price index. Relative to the world prices prevailing under the food and fuel crisis, prices under the financial crisis improve terms-of-trade by 0.5%. This causes the real exchange rate to appreciate by a further -1.4%. Together, lower prices for major exports and the real appreciation cause real exports to fall by 0.6% relative to the level registered in the food/fuel scenario in 2009. The real appreciation also favors imports, whose volume expands by 0.9%. Changes in sector production are opposite to those experienced during the 2008 commodity crisis. Crop production falls alongside world rice prices. Urban employment increases while rural employment declines. In terms of the components of absorption, the high import intensity of investment permits real investment to rise due to lower world prices for imported investment goods combined with the real appreciation. Consumers also benefit from the improved terms-of-trade in the aggregate; but declining agricultural GDP reduces farm incomes for poorer rural households, with poverty rising as a result.

The impact of the financial crisis is both negative and more pronounced in the FDI and Remittances scenarios (see columns labeled (4) and (5) in Table 7). As expected, falling FDI causes a substantial contraction in total investment. The reduced demand for imported capital goods helps maintain external balance without a large depreciation of the real exchange rate. At the same time, reduced FDI implies a reduction in the growth rate of the capital stock. Since the model is run on a semester basis, the reduction in FDI in the first half of 2009 leads to reduced capital in the second half of 2009. Overall, by end 2009, real GDP declines due to reduced capital availability, lower levels of labor employment, and declines in factor-specific productivity growth of 0.5 and 1.5 percentage points for rural and urban factors respectively. This decline in economic activity causes household incomes and real consumption spending to fall. The results for the Remittances scenario indicate that half of the overall decline in consumption spending during the financial crisis was due to falling remittances, which directly affects households' incomes. Declining remittance inflows also reduces the real appreciation.

The largest reduction in economic growth following the crisis was in manufacturing and other industry. This is consistent with the declines in prices, demand, and foreign direct investment actually observed. The largest declines in production were for textiles and clothing. Machinery and construction (i.e., "other industry") also contracted sharply because of lower investment demand, which uses these commodities intensively. FDI accounts for about a tenth and a third of total investment in agriculture and agro-processing respectively, and so these sectors contracted in the FDI Outflows scenario. Declining world prices and weaker consumer demand also contributed to the decline of agriculture during the financial crisis. These results are consistent with the observed declines in sector GDP in 2009.

The financial crisis caused employment to fall by 1.1% relative to the employment levels obtained in following the food and fuel crisis. More than 90% of the 430,000 job losses were in rural areas, which is where most of the workforce is employed. However, urban employment also fell. The share of the population below the US$2-a-day poverty line increased by 3.3 percentage points relative to the level attained in the food/fuel scenario in 2009. This is equivalent to an additional three million people living below the poverty as a result of the financial crisis. Furthermore, even though agriculture experienced the smallest relative contraction in output, rural poverty increases by more than in urban areas due to the declines, including job losses, in labor-intensive crop production. The bunching of rural households at consumption levels near the poverty line also implies a greater sensitivity of the poverty rate to consumption changes in rural versus urban areas.

*The 2009 government stimulus package*

Four components of the stimulus package are simulated, namely interest rate support to the private sector; public investments in agriculture; direct tax relief; and social transfers to households.[[8]](#footnote-8) We assume that the government draws on foreign reserves in order to inject funds into the private sector. This lowers the decline in investment demand relative to the remittances scenario (see the final column in Table 7). Tax relief and social transfers also increase consumption spending, although it is insufficient to fully compensate for the decline in household incomes caused by the financial crisis. The increase in recurrent government spending reflects additional expenditure on agriculture. Together the increase in investment, consumption and recurrent spending offsets some of the decline in absorption caused by the financial crisis. The use of foreign exchange reserves drives a real appreciation in the currency relative to the remittances scenario thus encouraging imports and further reducing exports.

Agricultural GDP growth accelerates under the simulated stimulus package. This reduces the decline in rural employment. Increased investment generates immediate demand for construction (i.e., "other industry"), which now declines at a slower rate. The overall decline industrial GDP caused by the financial crisis is also lessened by the stimulus package due to higher productivity levels, and despite the lag between providing interest rate support and the eventual translation of higher investment into new capital stocks. However, manufacturing relies on external demand, which is unaffected by the stimulus package. Thus, manufacturing growth remains largely unchanged. Rather, it is in the service sectors that the stimulus package generates additional urban employment. Lowering taxes and providing social transfers increases households' demand for consumer goods. Non-traded services, unlike industry, are less affected by import competition caused by the real appreciation. These results suggest that some of the resurgence in agriculture, construction and services during late-2009 can be attributed to the stimulus package.

Ultimately, the stimulus package prevents around two-fifths of the decline in total GDP caused by the financial crisis. The stimulus has a larger impacts on employment and causes a significant reduction in poverty. This is evident in Figure 4, which shows how the stimulus package lowers the increase in poverty caused by the financial crisis by about one third. This means that about 860,000 people are kept above the US$2-a-day poverty line as a result of the simulated stimulus package. While this is still above the poverty levels that would have been achieved without the financial crisis, it is well below the baseline scenario which excludes the gains from the 2008 commodity crisis. However, the gap between between the Food/Fuel and Stimulus scenarios in Figure 4 suggests that the increase poverty caused by the financial crisis will persist well into the future.

**6. CONCLUSION**

From a macroeconomic perspective, Vietnam has weathered the recent global crises relatively well. However, there is little rigorous analysis of why the effects were relatively small and not much quantitative evidence is available on how workers and households were affected, especially those at the lower end of the income distribution. In this paper, a dynamic economy-wide model was developed to decompose the effects of the crises and to translate the macro-level impacts of the crises into household incomes and poverty.

Model results indicate that the 2008 commodity crisis improved Vietnam's terms-of-trade. It raised aggregate welfare and reduced poverty, mainly by expanding exports in labor-intensive sectors. The 2009 financial crisis reversed the welfare gains from 2008. Even though world price shifts in 2009 improved Vietnamese terms of trade beyond the gains observed in 2008, reductions in demand for exports, FDI, and remittances caused a contraction in economic activity. The financial crisis pushed three million people below the US$2-a-day poverty line relative to the food/fuel scenario. The vast majority of the population that fell into poverty resided in rural areas. Agriculture and the rural nonfarm economy were limited in their ability to cushion the effects of the financial crisis. Vietnam's agricultural sector has a strong export-orientation, which makes it vulnerable to world market conditions.

The simulated impact of the government’s stimulus package shows that it has the potential to offset some of the welfare losses caused by the financial crisis and substantially reduce the impact on poor households. Overall, the combined net effect of the two crises had little effect on poverty (and other principal macroeconomic indicators) compared with the baseline (no crises) path even assuming the stimulus policies designed to counter the financial crisis had no effect on current welfare. Under the assumption of an effective stimulus package, poverty rates are actually lower than the baseline (no crises) path.

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Table 1: Structure of the Vietnamese economy, 2007

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Share of total (%) | | | | Export intensity | Import intensity |
|  | GDP | Employ-ment | Exports | Imports |
|  |  |  |  |  |  |  |
| Total GDP | 100.0 | 100.0 | 100.0 | 100.0 | 32.4 | 39.1 |
|  |  |  |  |  |  |  |
| Agriculture | 22.1 | 53.9 | 7.6 | 2.0 | 21.3 | 8.4 |
| Crops | 13.4 | 36.6 | 4.6 | 1.4 | 23.3 | 10.3 |
| Livestock | 2.7 | 8.5 | 0.4 | 0.0 | 7.4 | 1.6 |
| Forestry/fishing | 5.9 | 8.8 | 2.6 | 0.6 | 23.4 | 8.2 |
|  |  |  |  |  |  |  |
| Industry | 41.7 | 19.9 | 76.1 | 85.4 | 38.5 | 48.7 |
| Mining | 10.9 | 0.9 | 19.0 | 0.6 | 82.9 | 14.9 |
| Manufacturing | 20.1 | 13.3 | 57.1 | 84.9 | 40.7 | 57.8 |
| Agro-processing | 5.8 | 4.1 | 12.5 | 4.3 | 33.5 | 20.3 |
| Textiles/clothing | 3.7 | 2.2 | 25.8 | 15.3 | 68.6 | 62.2 |
| Wood/paper | 1.4 | 0.8 | 2.9 | 3.0 | 34.9 | 44.2 |
| Fuel/chemicals | 2.8 | 2.3 | 3.2 | 22.5 | 21.8 | 74.7 |
| Metals/machinery | 4.4 | 3.0 | 11.9 | 38.5 | 36.8 | 70.4 |
| Other | 2.8 | 1.4 | 1.4 | 2.7 | 8.1 | 17.6 |
| Other | 10.7 | 5.7 | 0.0 | 0.0 | 0.0 | 0.0 |
|  |  |  |  |  |  |  |
| Services | 36.2 | 26.1 | 16.3 | 12.6 | 22.0 | 20.5 |
|  |  |  |  |  |  |  |

Source: Authors’ calculations using the 2007 social accounting matrix (Arndt et al., 2009).

Note: ‘GDP’ is gross domestic product; ‘export intensity’ is the share of exports in gross

domestic output; ‘import intensity’ is the share of imports in total demand.

Figure 1: Annualized economic growth by major sectors, 2000-2009



Source: Authors' calculations using General Statistical Office (GSO, 2009a and 2009b).

Figure 2: Foreign investment, consumer prices and exchange rate, 2000-2009

Source: Authors' calculations using General Statistical Office (GSO, 2009a and 2009b).

Note: ‘Foreign direct investment’ is implemented and not registered investment.

Figure 3: World commodity prices, 2006-2009

Source: Authors' calculations using World Bank (2009b).

Table 2: Foreign merchandise trade, 2006-2009

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Quarterly average value (constant 2007 US$ million) | | | | | |
|  | 2006 | 2007 | 2008 | 2009  Q1 | 2009  Q2 | 2009  Q3 |
|  |  |  |  |  |  |  |
| Trade balance | -789 | -3,082 | -1,357 | 4,341 | -408 | -897 |
| Imports | 10,943 | 15,191 | 18,472 | 10,643 | 16,104 | 16,648 |
| Exports | 10,155 | 12,110 | 17,116 | 14,984 | 15,696 | 15,751 |
| Agric/food | 2,134 | 2,121 | 2,843 | 1,585 | 2,093 | 1,627 |
| Crude oil | 2,575 | 3,153 | 4,041 | 3,358 | 3,991 | 4,178 |
| Textiles/clothing | 2,080 | 2,468 | 3,499 | 2,220 | 4,122 | 3,262 |
| Other | 3,366 | 4,367 | 6,732 | 7,820 | 5,491 | 6,685 |
|  |  |  |  |  |  |  |

Source: Authors' calculations using General Statistical Office (GSO, 2009a and 2009b).

Table 3: Vietnam’s proposed stimulus package (January 2009)

|  |  |
| --- | --- |
|  | US$ billion |
|  |  |
| Total proposed cost | 8.6 |
| Interest support | 1.0 |
| Delayed payback for construction capital in 2009 | 0.2 |
| Advanced capital investment (from 2009/10) | 2.2 |
| Transfer planned investment capital (2008 to 2009) | 1.8 |
| Additional government bonds | 1.2 |
| Tax reduction | 1.6 |
| Other expenditures (including social safety) | 0.6 |
|  |  |

Source: Government of the National Assembly Report 77/CP-KTTH

(5 May 2009).

Table 4: Core model equations

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Production function | | | |  | | | | (1) |
| Factor payments | | | |  | | | | (2) |
| Import supply | | | |  | | | | (3) |
| Export demand | | | |  | | | | (4) |
| Household income | | | |  | | | | (5) |
| Consumption demand | | | |  | | | | (6) |
| Investment demand | | | |  | | | | (7) |
| Current account balance | | | |  | | | | (8) |
| Product market equilibrium | | | |  | | | | (9) |
| Factor market equilibrium | | | |  | | | | (10) |
| Land and labor expansion | | | |  | | | *f* is land and labor | (11) |
| Capital accumulation | | | |  | | | *f* is capital | (12) |
| Technical change | | | |  | | | | (13) |
|  | |  | | |  |  | | |
| Subscripts | | | | | Exogenous variables | | |  |
| *c* | Commodities or economic sectors | | | | *b* | Foreign savings balance (foreign currency units) | | |
| *f* | Factor groups (land, labor and capital) | | | | *r* | Foreign remittances | | |
| *h* | Household groups | | | | *s* | Total factor supply | | |
| *t* | Time periods | | | | *w* | World import and export prices | | |
| Endogenous variables | | |  | | Exogenous parameters | | |  |
| *D* | Household consumption demand quantity | | | | *α* | Production shift parameter (factor productivity) | | |
| *E* | Exchange (local/foreign currency units) | | | | *β* | Household average budget share | | |
| *F* | Factor demand quantity | | | | *γ* | Hicks neutral rate of technical change | | |
| *I* | Investment demand quantity | | | | *δ* | Factor input share parameter | | |
| *M* | Import supply quantity | | | | *η* | Capital depreciation rate | | |
| *P* | Commodity price | | | | *θ* | Household share of factor income | | |
| *Q* | Output quantity | | | | *κ* | Base price per unit of capital stock | | |
| *W* | Average factor return | | | | *ρ* | Investment commodity expenditure share | | |
| *X* | Export demand quantity | | | | *υ* | Household marginal propensity to save | | |
| *Y* | Total household income | | | | *φ* | Land and labor supply growth rate | | |
|  |  | | | |  |  | | |

Table 5: Shocks to the model

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | Change from baseline during half-year period (%) | | | |
|  |  | 2008:S1  (Jan-Jun) | 2008:S2  (Jul-Dec) | 2009:S1  (Jan-Jun) | 2009:S2  (Jul-Dec) |
|  |  |  |  |  |  |
| World prices | Rice | 30.0 | 10.0 | -15.0 | -5.0 |
| *(for selected* | Coffee | 7.0 | 0.0 | -15.0 | -3.0 |
| *products)* | Coal | 30.0 | 10.0 | -30.0 | 0.0 |
|  | Oil and fuel | 10.0 | 0.0 | -20.0 | -15.0 |
|  | Textiles and clothing | 5.0 | 0.0 | -10.0 | 7.0 |
|  | Fertilizer | 30.0 | 20.0 | -30.0 | -15.0 |
|  | Machinery | 5.0 | -5.0 | -10.0 | 0.0 |
|  |  |  |  |  |  |
| Foreign direct investment inflows | | - | - | -15.0 | -9.0 |
|  |  |  |  |  |  |
| Foreign transfers to households | | - | - | -5.0 | -5.0 |
|  |  |  |  |  |  |
| Stimulus package | Capital inflows | - | - | 15.0 | 15.0 |
|  | Recurrent spending | - | - | 3.0 | 3.0 |
|  | Land productivity | - | - | 3.0 | 3.0 |
|  | Social transfers | - | - | 8.0 | 8.0 |
|  | Direct tax rates | - | - | -6.0 | -6.0 |
|  |  |  |  |  |  |

Source: Authors' calculations using world prices from World Bank (2009b).

Table 6: Model results for the 2008 food and fuel crisis

|  |  |  |  |
| --- | --- | --- | --- |
|  | Baseline scenario | | Food/fuel (1) |
|  | Initial,  2007 | Change, 2008 (%) | Deviation from baseline, 2008  (%-point) |
|  |  |  |  |
| Real GDP | 100.0 | 7.0 | -0.2 |
| Absorption (C+I+G) | 113.3 | 7.3 | 1.1 |
| Consumption (C) | 57.6 | 5.3 | 1.5 |
| Investment (I) | 41.6 | 9.9 | 0.8 |
| Government (G) | 14.1 | 8.2 | 0.0 |
| Exports (E) | 76.5 | 7.3 | -1.0 |
| Imports (M) | 89.8 | 7.7 | 0.7 |
|  |  |  |  |
| Real exchange rate | 100.0 | 1.5 | -2.1 |
| Terms of trade | 100.0 | 0.0 | 2.3 |
| Exports | 100.0 | 0.0 | 7.7 |
| Imports | 100.0 | 0.0 | 5.3 |
| Consumer price index | 100.0 | 0.5 | -1.4 |
|  |  |  |  |
| GDP at factor cost | 100.0 | 7.0 | -0.2 |
| Agriculture | 22.1 | 3.5 | 0.5 |
| Crops | 13.4 | 3.4 | 1.9 |
| Livestock | 2.7 | 4.5 | -0.2 |
| Other | 5.9 | 3.0 | -2.2 |
| Industry | 41.7 | 8.1 | -0.2 |
| Mining | 10.9 | 6.2 | 0.5 |
| Manufacturing | 20.1 | 8.1 | -1.0 |
| Other | 10.7 | 10.2 | 0.7 |
| Services | 36.2 | 8.0 | -0.6 |
|  |  |  |  |
| Employment (mil.) | 39.1 | 2.7 | 0.9 |
| Urban | 11.2 | 4.0 | -0.3 |
| Rural | 27.9 | 2.3 | 1.4 |
|  |  |  |  |
| National poverty (%) | 47.3 | -1.4 | -3.6 |
| Urban | 15.2 | -1.8 | 0.2 |
| Rural | 59.0 | -1.2 | -5.0 |
|  |  |  |  |

Source: Results from the Vietnam DCGE and micro-simulation model.

Notes: The first column of numbers provides, from the top, baseline shares of GDP, initial price index levels, baseline shares of GDP at factor, employment in millions, and the poverty rate. The poverty rate is based on a USD 2 per day poverty line calculated using 2006 VHLSS (GSO, 2007).

Figure 4: National poverty headcount, 2007-2010

Source: Results from the Vietnam DCGE and micro-simulation model.

Note: Poverty rate is the US$2-a-day poverty line calculated using 2006 VHLSS (GSO, 2007).

Table 7: Model results for the 2009 financial crisis

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Food/fuel scenario (2) | | 2009 prices  (3) | FDI outflows  (4) | Remittances  (5) | Stimulus  (6) |
|  | Initial,  2008 | Change, 2009 (%) |
|  | Deviation from food/fuel scenario, 2009 (%-point) | | | |
|  |  |  |  |  |  |  |
| Real GDP | 100.0 | 7.2 | 0.5 | -3.4 | -3.7 | -2.3 |
| Absorption (C+I+G) | 115.0 | 7.6 | 1.5 | -4.1 | -5.3 | -2.2 |
| Consumption (C) | 57.6 | 5.2 | 0.9 | -2.7 | -4.3 | -1.8 |
| Investment (I) | 43.1 | 10.6 | 2.9 | -7.5 | -8.4 | -4.7 |
| Government (G) | 14.3 | 8.2 | 0.0 | 0.0 | 0.0 | 3.9 |
| Exports (E) | 76.2 | 7.7 | -0.6 | -4.5 | -4.1 | -4.4 |
| Imports (M) | 91.1 | 8.1 | 0.9 | -5.3 | -6.0 | -3.9 |
|  |  |  |  |  |  |  |
| Real exchange rate | 100.0 | 1.8 | -1.4 | -1.2 | -0.6 | -2.0 |
| Terms of trade | 100.0 | 0.0 | 0.5 | 0.5 | 0.5 | 0.5 |
| Exports | 100.0 | 0.0 | -6.8 | -6.8 | -6.8 | -6.8 |
| Imports | 100.0 | 0.0 | -7.3 | -7.3 | -7.3 | -7.3 |
| Consumer price index | 100.0 | 0.9 | 0.5 | 0.9 | 1.0 | 0.5 |
|  |  |  |  |  |  |  |
| GDP at factor cost | 100.0 | 7.3 | 0.4 | -3.4 | -3.6 | -2.2 |
| Agriculture | 21.5 | 3.2 | -0.1 | -1.6 | -1.8 | 0.3 |
| Crops | 13.2 | 3.3 | -0.6 | -1.8 | -1.9 | 0.6 |
| Livestock | 2.7 | 4.6 | 0.5 | -1.8 | -2.6 | -0.6 |
| Other | 5.6 | 2.3 | 0.6 | -1.3 | -1.3 | 0.1 |
| Industry | 42.1 | 8.4 | 0.4 | -4.6 | -4.9 | -3.9 |
| Mining | 10.9 | 6.2 | -0.8 | -1.0 | -1.0 | -1.1 |
| Manufacturing | 20.1 | 8.4 | 0.0 | -5.2 | -5.4 | -4.9 |
| Other | 11.1 | 10.6 | 2.2 | -7.2 | -8.0 | -4.8 |
| Services | 36.4 | 8.3 | 0.7 | -2.9 | -3.2 | -1.8 |
|  |  |  |  |  |  |  |
| Employment (mil.) | 40.5 | 2.7 | -0.1 | -1.0 | -1.1 | -0.3 |
| Urban | 11.6 | 3.9 | 0.6 | -0.2 | -0.3 | 0.2 |
| Rural | 28.9 | 2.2 | -0.3 | -1.3 | -1.4 | -0.6 |
|  |  |  |  |  |  |  |
| National poverty (%) | 42.3 | -1.3 | 1.0 | 3.0 | 3.3 | 2.3 |
| Urban | 13.6 | -0.7 | -0.6 | 0.5 | 0.5 | 0.0 |
| Rural | 52.7 | -1.5 | 1.6 | 3.9 | 4.3 | 3.2 |
|  |  |  |  |  |  |  |

Source: Results from the Vietnam DCGE and micro-simulation model.

Notes: The first column of numbers is similar to the first column of Table 6 but is based on simulation results from the food and fuel crisis scenario in 2008. From the top, the column contains shares of GDP, reinitialized price index levels, shares of GDP at factor, employment in millions, and the poverty rate. The poverty rate is based on a USD 2 per day poverty line calculated using 2006 VHLSS (GSO, 2007).

1. Adjusting for purchasing power, per capita GDP in 2006 was US$2363 (World Bank, 2009). [↑](#footnote-ref-1)
2. The number of tourists visiting Vietnam fell by 20% in 2009 from 2 million in 2008 (GSO, 2009b). [↑](#footnote-ref-2)
3. Wage elasticities are set at 0.30 for lower-educated labor groups and 0.15 for higher-educated labor. This reflects greater underemployment in rural areas where education levels are lower. [↑](#footnote-ref-3)
4. Income elasticities were estimated by Bingxin Yu (IFPRI) using the 2006 VHLSS. [↑](#footnote-ref-4)
5. This is modeled as an increase in *b* in eq.[8] in Table 5. [↑](#footnote-ref-5)
6. This implies a spending-to-productivity-growth elasticity of 0.05 since natural resource value-added is half of agricultural GDP and 5 percent of the state budget is allocated to agriculture (i.e., 0.03 / 0.05 / 0.5 x 0.05 = 0.06). This elasticity is below the econometrically estimated returns to irrigation (0.11), rural roads (0.07) and agricultural research and extension (0.06) (Fan et al., 2004) but reflects possible delays in the returns to investments. [↑](#footnote-ref-6)
7. The poverty headcount rate is the share of the population living below the US$2-a-day poverty line. [↑](#footnote-ref-7)
8. Note that our analysis does not consider the long-term implications of expanding the fiscal deficit and long-term debt position. [↑](#footnote-ref-8)