Journal of Asian Economics 55 (2018) 42–57

Contents lists available at ScienceDirect

Journal of Asian Economics

Full length Article

State-owned enterprise reform in Vietnam: A dynamic CGE analysis

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ARTICLE INFO

Article history:
Received 21 April 2017
Received in revised form 3 August 2017
Accepted 7 September 2017
Available online 13 September 2017

JEL classification:
D58
F14
O53
P31

Keywords:
State owned enterprises
CGE modeling
Vietnam

ABSTRACT

In this paper, we consider the potential impact of State-Owned Enterprise (SOE) reform in Vietnam. We model a baseline for the Vietnamese economy to the year 2035, and then consider how a limited reform of SOEs might affect the structure of output, trade and employment. The SOE reform modeled assumes a gradual and partial approach: SOEs that are considered strategic are excluded from reform, while SOEs that are profitable and perform better than their non-SOE counterparts are assumed to stay in state hands. Of the remaining SOEs, we assume only 50 percent are reformed over a five-year period from 2016. Our results suggest that even this limited SOE reform could increase cumulative baseline real GDP by nearly nine percent for Vietnam in 2035. Wages for all occupation groups are found to increase and investment in Vietnam is projected to rise by up to 16 percent, relative to the baseline.

1. Introduction[1]

Vietnam has implemented a range of ambitious reforms since 1986; however, reform of SOEs has been patchy. The total number of SOEs halved during the early years of the *Doi Moi* reforms that began in 1986, leading to a dramatic reduction in SOE employment (Cai & Liu, 2015; O'Connor,1998). However, subsequent efforts to reduce dependence on SOEs proved challenging (Phan & Ramstetter, 2004) and SOE reform came to a standstill in the early 2000s (Vu-Thanh, 2017). In the latter part of the 2000s, eager to create analogs of Korean and Japanese conglomerates, the Vietnamese government embarked on a plan to consolidate many of the remaining SOEs into state owned General Corporations and State Economic Groups (SEGs). Initially the General Corporations and SEGs did well, but weaknesses in the system soon became apparent, with the failure of several high profile businesses. During the 2006–2009 period, state agencies were estimated to comprise 36.1 percent of Vietnam's GDP (Dinh et al., 2010), a modest decline from the 1996–2000 (39.5 percent) and the 2001–2005 periods (38.7 percent) (VDR, 2012). SOEs remain a significant part of the economy, contributing an estimated 32.2 percent to Vietnam's

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[1] Thanks are due to the World Bank for funding and support of a broader background study, on which the current paper draws. We gratefully acknowledge very useful comments and suggestions from the anonymous reviewers as well as participants at the conference on *Trade, Industrialization and Structural Reforms in ASEAN*, January 9–10, 2017, Ho Chi Minh City.

https://doi.org/10.1016/j.asieco.2017.09.002
1049-0078/

GDP at the end of 2013 (OECD & KIPF, 2016).[2] However, there has been recognition in Vietnam that further reform of the SOE system is required, with reform of SOEs 'a crucial pillar' of the Government's structural reform and productivity agenda (ADB, 2015).[3]

SOEs in Vietnam claim a disproportionate share of national investment in land, property and physical assets, with a less than proportionate increase in enterprise performance. SOEs are generally not subject to hard budget constraints and are entitled to credit, investment and other privileges that are not available to private enterprises (Vu-Thanh, 2017). SOEs are frequently expected to be inefficient relative to other firms, with many economists believing "that SOE managers have weaker motives to pursue profit and efficiency than those in privately owned firms" (Ramstetter & Phan, 2013). While there is evidence that some SOEs in Vietnam may be relatively efficient and productive (Yang et al., 2015)[4] and there are potential benefits of SOEs that can be acknowledged, Taussig et al. (2015) argue that none of these outweighs the benefits to Vietnam of a revitalized reform process. Dinh et al. (2010) calculate the growth of value added in the state sector as a proportion of GDP at 4.1 percent, well below the average GDP growth rate of approximately seven percent for that period. The World Bank echoed this conclusion in the VDR (2012), highlighting that SOEs have comprised a disproportionate level of investment in recent years and have not performed well in their estimation. The VDR (2012) notes that in 2009, the average ratio of turnover (sales) to assets for SOEs was 1.1, compared to 21.0 for the entire economy, concluding that restructuring the SOEs will be important for Vietnam's future growth. The ADB adds that while a large share of aggregate investment tended to be absorbed by SOEs, contributions made to real GDP and overall employment were relatively low, compared to private enterprise (ADB, 2015). Thus, SOE reform continues to be an important part of the Vietnamese restructuring agenda.

In this paper, we model some potential impacts of further reform of SOEs in Vietnam. We begin by outlining the modelling approach, including an overview of the model used and baseline developed. We then discuss our approach to modelling SOE reform and the scenario considered for Vietnam. We then present an analysis of results for the SOE reform scenario modeled, including impacts on the overall economy, output, trade, employment and investment. Finally, we offer some concluding comments.

2. Modeling approach

2.1. Overview of model

Our analysis uses a modified version of the Dynamic GTAP model (GDyn), developed by Ianchovichina and McDougall (2012). This model is based on the well-known Global Trade Analysis Project (GTAP) global computable general equilibrium (CGE) model (Hertel & Tsigas, 1997). It includes many features of the standard GTAP model, including perfectly competitive markets, sophisticated consumer demand specifications and inter-sectoral factor mobility. In addition, the dynamic model incorporates investment behavior that allows for the gradual equalization of global rates of return over time, along with additional accounting relations to keep track of foreign ownership of capital.

The database used as a starting point for our modelling is GTAP v8.1L, with the choice of sectors and regions in the aggregation reflecting our focus on the Vietnamese economy. We aggregate the full global database to 26 countries and regions.[5] Our sectoral aggregation is designed to capture important sectors for Vietnam, with Appendix A Table A1 detailing the sectors modeled, including how they are further aggregated for reporting purposes.

The GTAP database used includes five labor categories, in contrast to earlier versions of the database, which included only skilled and unskilled labor (Narayanan et al., 2012); this provides us with a more nuanced labor market, reflecting the matching of the work force to the newly evolving economy. We extend the GDyn model to link labor demand by occupation to labor supply by education, allowing some mobility of workers by education across occupations. This is particularly important for developing economies, like Vietnam, that are seeking to raise the education level of their populations, and hence increase the productivity of their labor forces. Initially the supply of labor by education (tertiary, secondary and primary/none) is allocated across occupations based on data obtained on the education levels of workers in each occupational category in the base year, however, over time as the average level of education of the Vietnam worker increases, all occupations become more educated and productivity increases. This mechanism is described in more detail in Minor, Walmsley and Strutt (2015).

[2] Though Ramstetter and Nguyen (2017) note that there are often large discrepancies between estimates of the share in economic activity of SOEs from alternative sources.

[3] For example, the Government of Vietnam requested technical assistance from the Asian Development Bank to support implementation of the State-Owned Enterprise Reform and Corporate Governance Facilitation Program (SRCGFP) (UNICON, 2014).

[4] For example due to the Baron-Myerson effect, where SOEs in Vietnam may be much more capital intensive and have higher labor productivity than private firms (Yan et al., 2015).

[5] Vietnam, Australia, New Zealand, China, Hong Kong, Japan, Korea, Taiwan, Indonesia, Malaysia, Philippines, Singapore, Thailand, India, Canada, USA, Mexico, Chile, Peru, Russia, Europe, Rest of ASEAN, Rest high income economies, Rest low-middle income economies, Rest upper-middle incomes economies, and Rest lower income economies.

Table 1
Average annual growth in real GDP and population, Vietnam, China and other (percent).

Regions	2008–2014	2015–2020	2021–2025	2026–2030	2031–2035
Real GDP					
Vietnam	5.8	6.3	6.0	5.6	5.5
China	8.8	7.0	6.0	4.9	4.0
High income economies	0.9	2.3	2.2	2.2	2.3
Upper-middle incomes economies	2.6	3.4	3.4	3.2	2.9
Low-middle income economies	5.3	5.9	5.8	5.3	4.8
Lower income economies	5.5	6.1	5.4	4.6	3.9
Population					
Vietnam	1.0	0.8	0.6	0.4	0.3
China	0.6	0.5	0.2	0.1	−0.1
High income economies	0.6	0.4	0.3	0.2	0.1
Upper-middle incomes economies	1.1	0.9	0.7	0.6	0.5
Low-middle income economies	1.6	1.4	1.3	1.1	1.0
Lower income economies	2.2	2.2	2.0	1.9	1.8

Source: Authors' model results, based on external forecasts and assumptions detailed in Minor, Walmsley and Strutt (2015).

2.2. Baseline

We first build a baseline scenario for the Dynamic GTAP model for the period modeled through to 2035. Continuing economic growth and structural change in Asia and the rest of the world is likely to have a significant impact on regional economies and trade patterns (Anderson & Strutt 2014). Thus having an appropriate baseline is very important, particularly for a rapidly evolving economy such as Vietnam, then the analysis of SOE reform can be undertaken relative to the baseline environment. To build this baseline scenario, forecasts are obtained of key exogenous variables, including population, labor and technological change, as well as implementation of trade agreements and we augment the GDyn model to endogenously accommodate changes in income elasticities over time.[6]

Table 1 depicts the average annual growth rates in real GDP for Vietnam, China and other aggregate regions. Growth is particularly high in the low middle and low-income economies, reflecting rises in total factor productivity (TFP) and investment in the developing countries. The lower, but continued growth in the high-income economies, including Asia, is due to continued investment in these economies. Population growth rates reflect declining populations in high-income economies and China, and to a lesser extent Vietnam and the upper-middle income economies.

2.3. Modeling SOE reform

As the Vietnamese government continues to consider restructuring of the SOE sector, the question arises: how could Vietnamese growth and development be effected by these changes? Benefits from reforming SOEs may be great, but they can be difficult to achieve as SOE reforms can be complex (OECD, 2010). While it is impossible to know exactly what reforms will take place in coming years, the VDR (2012) suggests that SOE reform might include several key elements aimed at increasing the efficiency of SOEs:

- replacing planning powers with substantial autonomy;
- giving enterprises the authority to set prices and determine investment;
- giving managers the right to lay off excess workers within prescribed guidelines;
- allowing enterprises to sell excesses production at market prices; and
- setting hard budget constraints.

The VDR (2012) suggest that not all SOEs will be candidates for reform and the following groups of SOEs are likely to be identified:

- those that need to be immediately reformed with the government stake reduced to under 51 percent;
- those SOEs which require management restructuring before being later sold; and
- those that will always remain one hundred percent under state ownership control.

Using these guidelines, a nuanced scenario of SOE reform is defined and the potential impact of those reforms on Vietnamese income and growth is examined. Specifically, we employ the Enterprise Survey data set provided by the World

[6] See Minor, Walmsley and Strutt (2015) for full details of the baseline, including assumptions and data sources.

Table 2
Vietnam State owned enterprises (SOE), sales, assets and average increase in output resulting from a fifty percent restructuring of assets out of SOE sector (billion dong and percent).

Sector	Sales (2012)			Assets (2012)		
	Total	SOE	SOE to total	Total	SOE	SOE to total
Agriculture						
Basic agriculture (rice, grains, vegetables and fruit)	102,342	82,251	80%	259,002	191,953	74%
Processed food	1,191,772	175,309	15%	703,481	117,550	17%
Fish and livestock	26,346	11,281	43%	18,808	4925	26%
Forestry and wood products	91,225	9005	10%	122,091	14,942	12%
Petroleum and Manufactures						
Oil, gas, minerals	1,101,088	698,027	63%	2,833,623	2,233,586	79%
Textiles, apparel, and leather	549,155	27,528	5%	439,487	28,243	6%
Chemicals, rubber and plastics	495,758	87,877	18%	400,761	80,979	20%
Transport and other manufactures	640,082	72,195	11%	603,183	115,598	19%
Electrical machinery and metals	1,557,697	69,242	4%	982,428	64,875	7%
Services (Selected)						
Other services (govt and private)	1,080,705	962,436	89%	2,008,015	1,775,047	88%

Source: Vietnam Enterprise Survey (2008–2013) provided by the World Bank Group and authors' model results and calculations. See Appendix A Table A2 for details and the mapping to sectors used in this study. Detailed study sectors (except where noted).

Bank; this has sector level information on SOE sales, assets, and employment for the period 2008–2012.[7] We focus analysis of the Enterprise Survey data on the year 2012.

Initial analysis of the Enterprise Survey data confirms previous analysis by Dinh et al. (2010) that while the SOE sector is estimated to generate 30 percent of sales in 2012, it possesses nearly 37 percent of Vietnamese business assets.[8] Table 2 illustrates selected data from the Enterprise Survey, showing considerable variation in the sales to asset ratios of SOEs across sectors. Notably, some SOE sectors report a higher proportion of sales than their share in sector assets. For example, in basic agriculture, SOEs comprise 80 percent of total sales, while they only control 74 percent of assets.[9] While in sectors such as textiles, apparel and footwear the SOE sector appears to be performing as well as the non-SOE sector, as measured by sales to assets. Appendix A Table A2 provides further details of the 56 Vietnamese sectors and the performance of SOEs relative to non-SOE enterprises.

The potential impact of restructuring SOEs will depend on which of the sectors are restructured. In our analysis, we classify enterprises into the following categories:

- Strategic SOE sectors. These sectors include extraction, health, human services, waste disposal, and national defense among others and are excluded from SOE reform.[10] (Category A);
- Highly profitable SOEs, which when compared to the non-SOE sector, have higher sales to asset ratios, the government retains these SOEs, since reform is not likely to improve their performance (Category B);
- SOEs selected for reform. These sectors are those that have lower than average sales to asset ratios and are likely to benefit from reform (Category C).

Appendix A Table A2 lists each of 56 Vietnamese sectors, as reported in the SOE database, for 2012 and their status as being: a) strategic; b) no reform expected; and c) selected for reform. For example, in the forestry and fishing sector, the sales to asset ratios of SOEs is on a par or better than the non-SOE sectors and therefore is not considered for reform (category B). Meanwhile, coal and oil extraction are considered strategic assets (category A) and will remain under the control of the government as a SOE. Finally, the sales to asset ratios of SOEs in the processed food and textile sectors suggest that these sectors might benefit from restructuring and some alternative form of organization and hence they are allocated to category C.

[7] The database was provided by Viet Tuan Dinh, World Bank (see General Statistics Office, 2016).
[8] Figures in the Enterprise Survey database differ somewhat in the total amounts, where the percent of SOE assets are even higher, at 39 percent of total assets. The percent of SOE to total sales is proportionally the same as reported here.
[9] A question to be explored in future analysis is the role of state trading companies in the wholesale and retail sectors, suggesting rents in that sector, which may be economically inefficient despite the high sales to asset ratio.
[10] Specifically, we assume the government will not reform International Standard Industrial Classification (ISIC) sectors including: Group C-Mining and quarrying (including oil, gas and petroleum extraction); Group E-Electricity, gas and water distribution and supply; Group L-Public administration, defense, or compulsory social programs; Group M-Education; Group N-Health and social work; Group O-Other community, social and personal services activities, such as sewage and waste disposal.

Table 3
Vietnam projected sector change in productivity (2015 share in production and average change in sector productivity).

Sector	Projected share in 2015 production	Average change in productivity
Agriculture		
Rice and other grains	5.7	0.0
Vegetables, fruit, nuts other basic ag	2.9	0.0
Fish and livestock	4.6	0.0
Processed food	5.5	0.5
Forestry and wood products	3.5	0.4
Petroleum and Manufactures		
Oil, gas, minerals	10.0	0.7
Textiles, apparel, and leather	18.0	0.4
Chemicals	4.8	2.2
Transport and other manufactures	4.9	5.1
Electrical machinery and metals	8.4	0.5
Services		
Construction, insurance, business services	10.7	2.8
Trade, transport and communications	8.8	9.5
Other services (govt and private)	12.2	0.0
Total/average	100.0	1.7

Source: Vietnam Enterprise Survey (2008–2013) provided by the World Bank Group and authors' model results and calculations. See Appendix A Table A2 for details of aggregated GTAP sectors.

Table 4
Overview of SOE reform impacts on Vietnam 2020–2035 (cumulative percent change relative to baseline—except where noted).

	2020	2025	2030	2035
Real GDP	5.3	7.5	8.4	8.7
Real exports	2.9	6.3	8.0	8.5
Real imports	4.3	6.1	6.3	5.9
Real investment	14.5	14.8	11.6	8.9
Real capital stock	3.3	8.3	10.3	10.2
Change in trade balance (millions of US$ 2007)	−5,009	−5,435	−3,968	−2,406

Source: Authors' model results and calculations.

We assume that fifty percent of SOE assets in selected sectors (category C) are restructured to obtain the same sales to asset ratio as non-SOE enterprises. Recognizing that the Vietnamese government is likely to take a gradualist[11] approach to SOE reforms, we implement these shocks over a five year period from 2016 to 2020. Two factors will determine the extent to which a sector might benefit from reorganization: firstly, the relative difference between the SOE and non-SOE sales to asset performance; and secondly the relative size of the SOE sales to total sector sales. The worse the SOE sales to asset performance relative to non-SOEs, and the larger the share of SOE sales in total sales, the greater will be the projected impact of reform, other things held equal.

The data in Table A2 provide the basis for projecting productivity growth of SOE reform in our model. However, we note several important limitations of the SOE data provided in the Enterprise Survey (the source of the data in Tables 2 and A2). First, the enterprise data are for 2012 while our policy scenario is implemented from 2016. Second, some of the data in the survey were missing. To reduce the impact of these limitations, the enterprise data were re-weighted using GTAP output data. Table 3 includes the projected productivity changes employed in the model, by sector, after weighting by the GTAP output data. Overall, we project an industry- and service-wide productivity increase of 1.7 percent resulting from reforming fifty percent of the SOEs selected as candidates (category C).

3. SOE reform analysis

In the following sections, we review the impacts of the SOE reform, as modeled by the increases in productivity reported in Table 3. As mentioned earlier, we implement the productivity increases evenly over a five year period from 2016 to 2020. Hence, all productivity shocks are concluded by the year 2020, although the ongoing benefits from the reform on investment are likely to continue beyond 2020, therefore, we examine the impact of these reforms to 2035.

[11] The VDR (2012) notes that the Vietnamese government prefers marginal reforms over "big bang" solutions and that this gradualist approach is unlikely to change in the case of SOE reform: "Therefore, reaching consensus on the extreme position such as equitizing all SOEs will be difficult" (VDR, 2012, p 42).

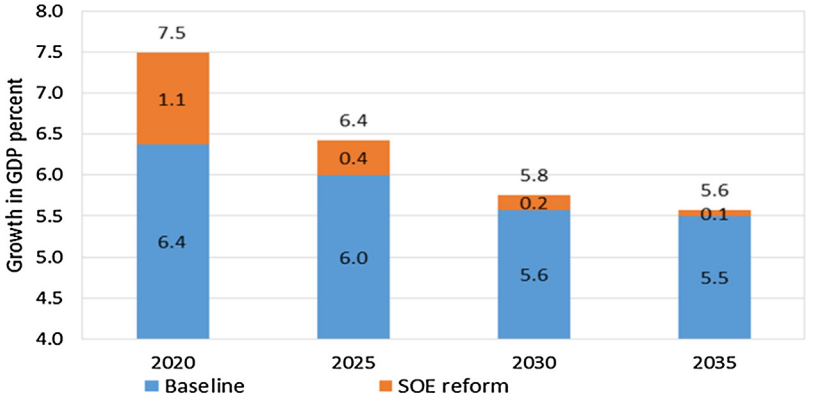

Fig. 1. Vietnam change in real GDP due to Baseline and SOE reform, 2020–2035 (average annual growth*).
*Average annual growth is calculated as the average of the prior five-year period (e.g., 2020 includes the average of 2016–2020).
Source: Authors' model results and calculations.

3.1. Overview

Overall, Vietnam's GDP and investment increase with the SOE reform we model, increasing in all years following the reform (Table 4). By 2035, real GDP has increased by 8.7 percent relative to the baseline. Investment increases by 8.9 percent and capital stocks increase by 10.2 percent relative to the baseline.

In the short term, the trade deficit increases (2020–2025) with the policy reform, reflecting increased investment in Vietnam, then the impact begins to dampen in the long run (2030–2035). Investment growth is strongest in the period following the SOE reform (2020–2025), but diminishes in later years (2030–2035) once the reforms have been completed and investment is higher.

Fig. 1 depicts the average annual growth in real GDP over five year periods between 2016 and 2020. For the period 2016–2020 (marked 2020 in Fig. 1), Vietnam's growth in real GDP increases by 1.1 percentage points over the projected baseline average annual growth in real GDP, resulting in an average annual growth rate of 7.5 percent. After the reforms are completed, their impact is reduced, with the increase in average annual growth in real GDP declining to 0.4 percentage points per annum (2020–2025). This continued growth in real GDP after the reforms are completed is due to the additional investment and capital. In the longer term, 2030–2035, real GDP growth rates return close to the baseline growth, though the cumulative increase in real GDP remains higher than without the reform (Fig. 2).

3.2. Output

Fig. 3 provides an overview of cumulative changes in Vietnamese output between 2020 and 2035. The results broadly follow the changes in productivity we projected to result from SOE reform (Table 3). Changes in output are greatest in the services and manufacturing sectors, the two sectors projected to experience the largest increases in productivity. Growth for

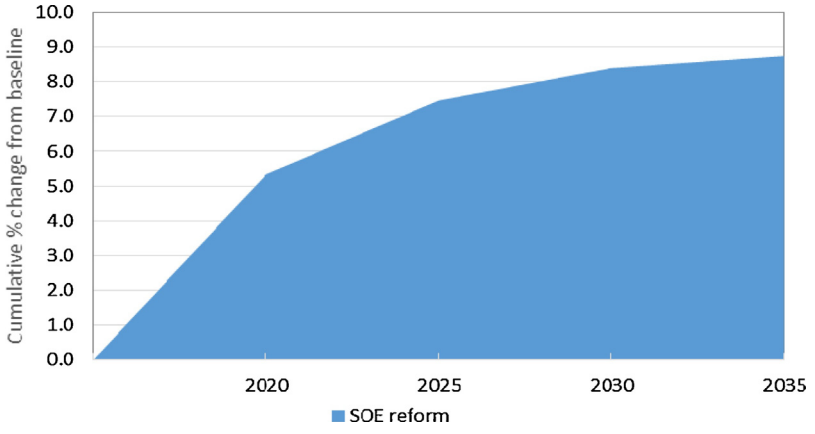

Fig. 2. Vietnam's change in real GDP due to SOE reform, 2020–2025 (cumulative percent change relative to baseline).
Source: Authors' model results and calculations.

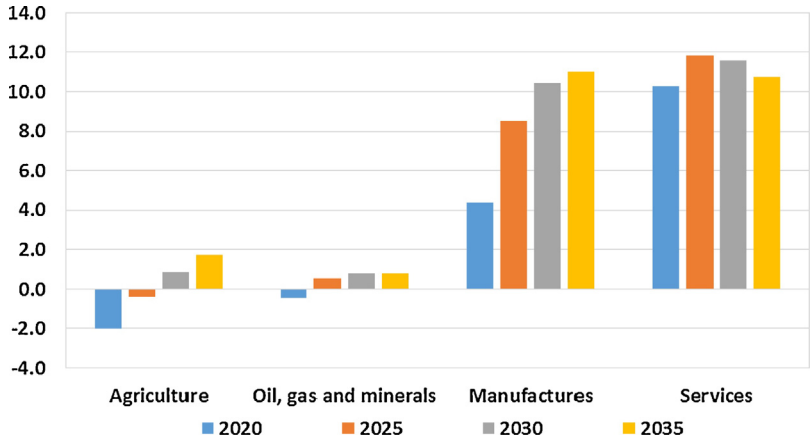

Fig. 3. Vietnam's change in real output due to SOE reform, by major sector, 2020–2035 (cumulative percent change relative to baseline). Source: Authors' model results and calculations. Major study sectors.

the services sectors is projected to peak at nearly 12 percent over baseline in 2025, while manufactures growth is expected to be more than 10 percent over baseline growth by 2035 (Fig. 3).

Agriculture, along with extractive sectors, which are projected to have lower than average productivity increases as a result of SOE reform, are expected to see a decline in their growth rates relative to the baseline through 2020. By 2030, however, both the agriculture and oil, gas and minerals sectors are projected to experience modest growth over the baseline. This pattern of initial declines, followed by later increases can be seen throughout the results for both output and exports. The pattern can be traced back to the size of the productivity shocks. Table 3 shows that there are a couple of manufacturing and service sectors that gain significantly from the SOE reforms, while most other sectors' productivity gains are smaller or zero. The productivity shocks have the effect of reducing prices, which in turn raises demand and production or output. The larger the productivity shock, the larger the increase in demand and production of these commodities. Increased production in these manufacturing and services sectors brings about increased competition for resources (capital and labor) by these sectors. The rental price of capital and the wage rate of labor rise. Those sectors with the largest productivity gains are better placed to compete for these factors of production, since the productivity gains lower their prices and raise demand for their product, therefore output rises. Those sectors with smaller productivity gains see the benefits of the productivity gains offset by a rise in the cost of resources and hence output falls, at least in the short run. The rise in the rental price of capital, however, has a secondary benefit as it causes the rate of return in Vietnam and hence overall investment to rise. Over time, this investment causes an accumulation of capital stocks that reduces the rental price of capital, thereby lowering the cost of production across all sectors and allowing other sectors to eventually take advantage of the productivity gains from the SOE reforms.

Table 5 provides a detailed decomposition of results from Fig. 3. The commodity level detail is generally consistent with the sector level results, with the exception of fish and livestock in agriculture, which increases in output even in the initial period, and electrical machinery in manufactures, which reduces output slightly in the initial period.

As was the case with the oil, gas and minerals sector, the electrical machinery and metals sector experiences only a small increase in productivity as a result of the SOE reforms (Table 3). Hence, the increase in factor costs for labor and capital causes output to fall initially, although as capital rentals fall over time the sector recovers and is able to take advantage of its increased productivity.

The fish and livestock sector is slightly more complicated since this sector did not experience a productivity increase as a result of the SOE reform, yet it still experiences an increase in output in the initial period (2016–2020). In contrast to other agricultural sectors, livestock is an input into investment. As indicated in Table 4, investment in Vietnam grows rapidly because of the SOE reform. This growth in investment increases the demand for investment goods, including livestock, giving a boost to demand for these products, even in the absence of a shock to productivity in that sector. As investment moderates, all sectors, including fish and livestock, then benefit from the decrease in the rental price of capital resulting from increased capital stocks.

3.3. Exports

Fig. 4 illustrates the changes in real exports resulting from SOE reform for four broad sector classifications. Exports of both manufactures and services increase, while agriculture and oil and gas exports decrease (or remain the same) as baseline exports. Cumulatively, services exports increase by approximately 17 percent over baseline exports. Similarly, manufactured exports are projected to grow by nearly 10 percent over the baseline by 2035. In fact, exports of manufactures grow modestly up to the last year of SOE reform (2020) and then continue to grow, more than doubling the 2020 cumulative gain in exports

Table 5
Vietnam's change in real output due to SOE reform, by sector, 2020–2035 (cumulative percent change relative to baseline and share in value added).

	Baseline share in value added 2015	Cumulative percent change from baseline growth			
Sector		2020	2025	2030	2035
Agriculture					
Rice and other grains	6.1	−0.9	−0.6	−0.4	−0.2
Veg, fruit, nuts and other agriculture	6.1	−1.4	−1.0	−0.8	−0.6
Fish and livestock	7.4	0.4	0.6	0.8	1.2
Processed food	2.8	−1.8	−0.4	0.9	2.0
Forestry and wood products	4.2	−6.4	−0.8	2.5	3.6
Petroleum and manufactures					
Oil, gas, minerals	15.4	−0.5	0.5	0.8	0.8
Textiles, apparel, and leather	6.9	0.0	3.2	4.7	5.2
Chemicals	2.5	7.7	12.2	14.1	14.6
Transport and other manufactures	2.5	27.8	35.3	39.1	40.9
Electrical mach. and metals	3.2	−0.3	3.9	5.5	5.5
Services					
Construction, insurance, business services	11.1	14.1	16.8	16.9	17.3
Trade, transport and communications	9.0	20.0	19.9	17.6	14.5
Other services (govt and private)	22.7	0.4	2.6	3.8	3.7

Source: Authors' model results and calculations. Data for detailed study sectors.

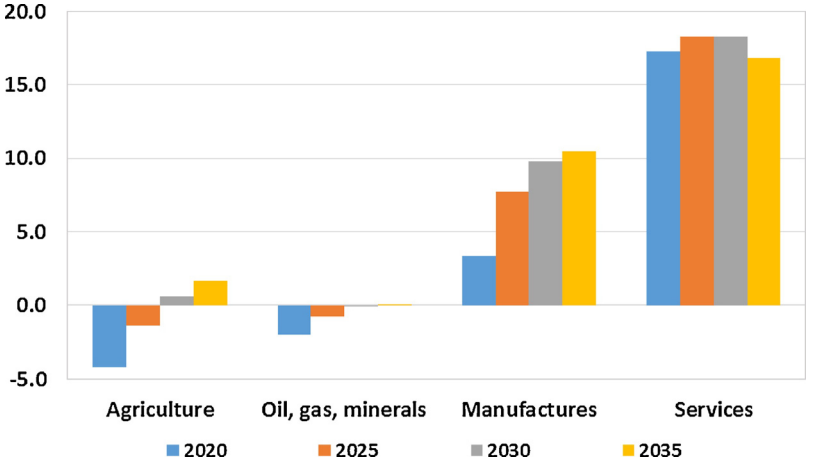

Fig. 4. Vietnam's change in real exports due to SOE reform, by major sector, 2020–2035 (percent change from baseline).
Source: Authors' model results and calculations. Major study sectors.

(Fig. 4). This again underscores the importance of productivity growth combined with capital accumulation as a means of achieving long run growth.

Table 6 illustrates the cumulative change in Vietnam's exports relative to the baseline during the period 2020–2035. Agricultural exports generally decline in early years, and then improve in later years. The two agricultural sectors, processed food along with forestry and wood products, that experienced some productivity improvement as a result of the SOE reform, also experienced this initial decline, followed by an eventual rise in exports relative to the baseline by 2035.

Exports of petroleum and manufactured products generally increase under the SOE reform scenario. Oil and gas exports, which are capital intensive, fall as the cost of capital increases under SOE reform, but eventually increase relative to the baseline in 2035 as capital cost moderate. The textiles, apparel and leather sector also declines initially. In this case, the textiles sector is the main beneficiary of the productivity shock, while apparel is the main export commodity. Hence, the initial fall in exports is the result of the high cost of producing apparel as resources become more expensive. Electrical machinery, like textiles, experiences a small productivity improvement from SOE reform, but increased capital rental rates initially cause a reduction in exports, as these additional costs exceed the modest productivity increase due to SOE reforms. In the longer term, as capital costs attenuate, exports increase above the baseline.

Table 6
Vietnam's change in real exports due to SOE reform, by sector, 2020–2035 (cumulative percent change relative to baseline).

Sector	Share of exports 2015	Cumulative percent change from baseline			
		2020	2025	2030	2035
Agriculture					
Rice and other grains	2.4	−2.8	−2.2	−1.8	−1.8
Vegetables, fruit, nuts other basic ag	3.7	−1.8	−1.5	−1.4	−1.3
Fish and livestock	0.3	−6.8	−7.6	−6.8	−3.9
Processed food	5.4	−3.4	−1.4	0.3	1.7
Forestry and wood products	6.0	−6.4	−0.8	2.4	3.5
Petroleum and manufactures					
Oil, gas, minerals	16.5	−2.0	−0.7	−0.1	0.1
Textiles, apparel, and leather	32.9	−0.1	3.0	4.6	5.1
Chemicals	5.0	8.4	12.7	14.6	15.0
Transport and other manufactures	3.9	38.8	45.4	49.0	51.0
Electrical machinery and metals	16.4	−1.0	3.5	5.2	5.2
Services					
Construction, insurance, business services	3.4	17.4	23.5	27.0	28.4
Trade, transport and communications	2.6	37.9	29.7	22.6	16.4
Other services (govt and private)	1.7	−11.0	−3.7	0.4	1.1
Total	100.0	2.9	6.3	8.0	8.5

Source: Authors' model results and calculations. Detailed study sectors.

3.4. Imports

Fig. 5 illustrates Vietnam's imports by broad sector classification. Imports of all commodities including agricultural, oil, gas, mineral, manufactured and services increase relative to the baseline.

The growth in oil, gas, and minerals imports is notable, since they are nearly twice as large as the increase in imports of the next largest category, manufactures. Although oil, gas and mineral products exhibit an increase in supply prices in the initial years, due to higher capital and labor costs, this cannot fully explain the rise in imports of these products. Instead, we have to look at the derived demand for these goods – i.e., the end products that employ them most intensively. Demand for oil, gas and minerals comes from air and other transport (27 percent of intermediate demand is for this input), construction (19 percent of intermediate demand), and other services (nearly 9 percent of intermediate demand). As discussed above, all these sectors experienced rapid growth in output under the SOE reform, and as a result will increase their demand for intermediate goods (domestic and imported), as well as resources. The rise in demand for services imports is also due to its demand as an intermediate into manufactures and other services.

Table 7 illustrates that these broad results for import growth generally hold at the commodity level, except in a few cases of rice, textiles, and trade and transport services, which are all slightly negative through 2020. As mentioned above these declines are generally due to reduced intermediate demand caused by reduced production of the final commodity which uses the intermediate input or reduced input demand due to increased productivity or both.

In the case of rice and other grains, rice imports increase, following the broad trend, however imports of other grains fall as the agriculture sector experiences a decline in output and hence reduces its intermediate demand for other grains. In the

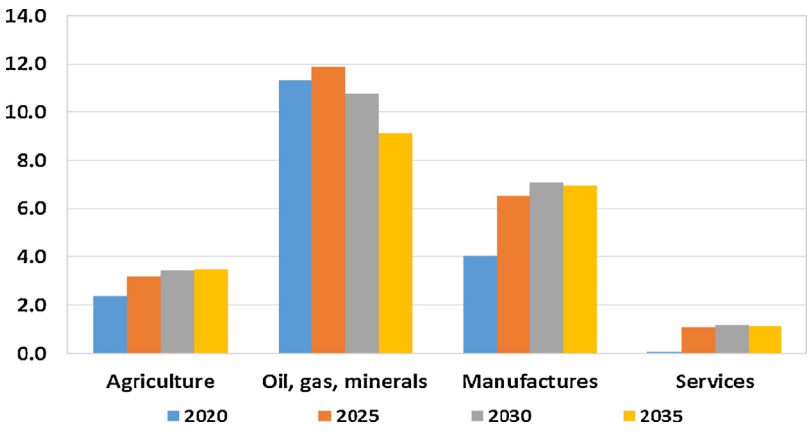

Fig. 5. Vietnam's change in real imports, by major sector, due to SOE reform, 2020–2035 (cumulative percent change relative to baseline).
Source: Authors' model results and calculations. Major study sectors.

Table 7
Vietnam's change in real imports due to SOE reform, by sector, 2020–2035 (cumulative percent change relative to baseline).

Sector	Share of imports 2015	Cumulative percent change from baseline			
		2020	2025	2030	2035
Agriculture					
Rice and other grains	0.6	−0.5	0.2	1	1.7
Vegetables, fruit, nuts other basic ag	1.8	1.2	3	3.9	4.4
Fish and livestock	0.5	5.3	5.9	5.7	5.1
Processed food	5.6	2.2	2.3	2.4	2.4
Forestry and wood products	1.8	3.8	5	5.1	4.8
Petroleum and manufactures					
Oil, gas, minerals	12.8	11.3	11.9	10.8	9.1
Textiles, apparel, and leather	14.9	−0.4	2.3	3.7	4.1
Chemicals	13.5	2	4.8	6	6.4
Transport and other manufactures	8	5.5	8.3	9	9.1
Electrical machinery and metals	29.7	6.9	8.9	8.7	7.9
Services					
Construction, insurance, business services	5.3	2.3	3.7	3.8	3.5
Trade, transport and communications	3.9	−5.7	−4.2	−3.7	−3.4
Other services (govt and private)	1.6	7.3	5.9	5	4.9
Total	100	4.3	6.1	6.3	5.9

Source: Authors' model results and calculations. Detailed study sectors.

case of textiles, apparel and leather products, imports of textiles fall as demand falls due to the increase productivity of the Vietnamese textile sector. This is in contrast to the situation with exports, reviewed above, where exports of apparel dominated results. Here, imports of textiles decline due to the enhanced productivity derived from SOE reform in that sector.

Finally, trade, transport and communication services imports decline because of the SOE reform since this domestic sector grows rapidly in Vietnam as a result of the SOE reform. Table 3 indicates that this sector gains the most in terms of productivity as a result of SOE reform, more than double that of any other sector in the Vietnamese economy. These strong productivity impacts overwhelm any derived demand (reduced output of the final product), as all sectors substitute towards these domestic services.

3.5. Wages, employment and rental rates

As discussed above, the increase in the manufactures and services sectors increases demand for labor. Table 8 indicates the manufacturing sector increases its demand for all labor types, although the increase in low skilled labor is largest. Demand for all occupations by the agriculture, and oil, gas and minerals sectors declines as labor moves to the growing manufacturing and services sectors. The demand for labor in services is more varied. The demand for managers and

Table 8
Vietnam's change in labor demand due to SOE reform, by major sector, 2035 (cumulative percent change relative to baseline).

	Agriculture	Oil, gas, and minerals	Manufactures	Services
Managers and professionals				
Share of workers in sector (2015)	7.2	7.2	18.5	67.1
Cum difference 2035	−2.8	−1.9	5.0	3.0
Technicians and associate professionals				
Share of workers in sector (2015)	1.7	1.1	4.2	93.0
Cum difference 2035	−3.2	−2.1	4.4	−2.0
Clerks				
Share of workers in sector (2015)	4.0	5.2	8.4	82.5
Cum difference 2035	−2.3	−1.8	5.5	0.6
Sales and service worker				
Share of workers in sector (2015)	7.0	5.9	14.3	72.9
Cum difference 2035	−2.3	−1.9	5.5	0.7
Low skilled				
Share of workers in sector (2015)	55.3	9.8	19.8	15.1
Cum difference 2035	−1.3	−1.7	5.7	−0.6

Source: Authors' model results and calculations.

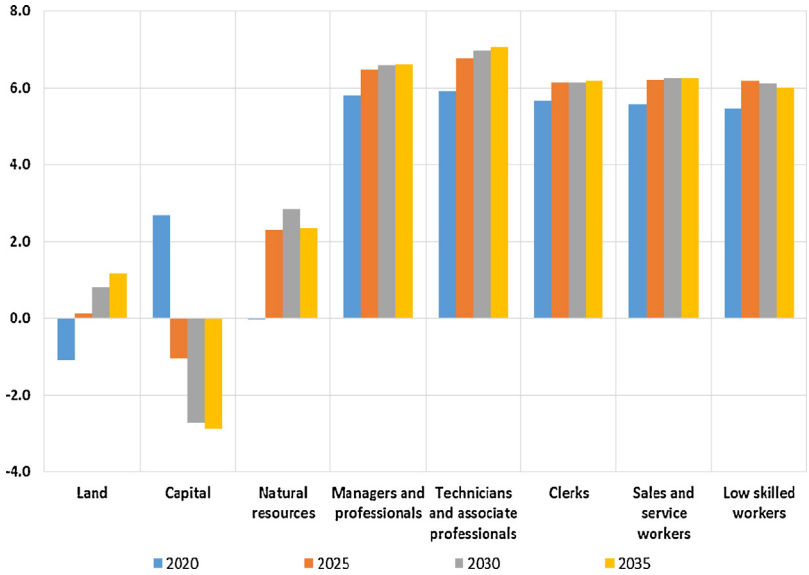

Fig. 6. Vietnam's change in real wages and rental rates of capital, land and natural resources due to SOE reform, 2020–2035 (cumulative percent change relative to baseline).
Source: Authors' model results and calculations

professionals increases three percent over the baseline, while the demand for unskilled labor deceases slightly, changing by −0.6 percent as the increased manufacturing sectors' demand causes them to move away from services.

Fig. 6 provides an overview of factor costs. In general, real wages for workers increase by between 5.5 percent for low skilled workers in 2020, to 7.1 percent for technicians and professionals in 2035. By 2035, real wages for all labor categories increases to between six and seven percent from baseline. The real rental rate on land declines by one percent in 2020 as agricultural production falls, but then recovers with the agriculture sector to about one percent above baseline by 2035. The real rental rate on capital exhibits the most variability over time. The rental rate on capital initially increases by 2.7 percent in 2020. However, as investment increases and capital stocks grow, the real rental rate on capital declines to less than zero in 2025 and falls to −2.9 percent in 2035, relative to the baseline.

3.6. Investment

The reform of the SOE sector leads to increasing real returns to capital in Vietnam in the short run (Fig. 7), as manufacturing and services increase their demand. Investment responds to the increased rate of return caused by the higher rental rate on capital. Investment increases to just over 16 percent over baseline investment by 2022 and then begins to

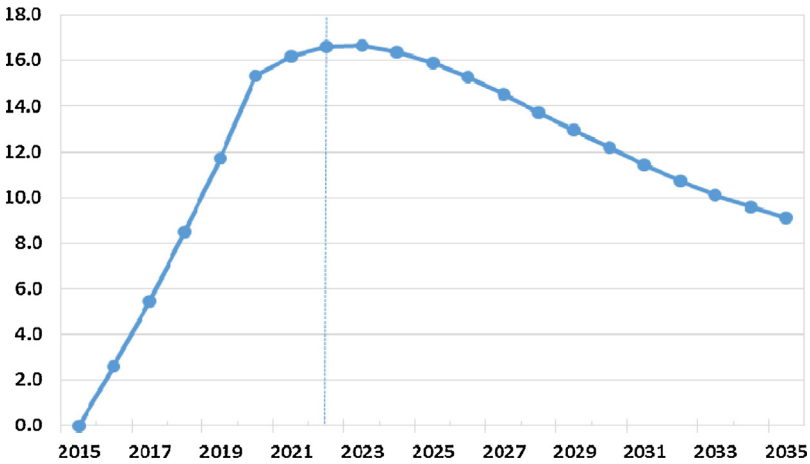

Fig. 7. Vietnam's change in real investment due to SOE reform, 2015–2035 (cumulative percent change relative to baseline).
Source: Authors' model results and calculations.

decline as the real rental rate on capital declines. The increase in investment, like other sectors, results in a derived demand for intermediate inputs, such as livestock, construction services, and transport equipment.

4. Concluding comments

SOE reforms appear to be an important potential contributor of future growth for Vietnam. The reform we model assumes a gradual and incomplete approach to SOE reform. SOEs that are considered strategic, such as government service providers, are excluded from our simulated impacts, while SOEs that are profitable and perform better than their non-SOE counterparts are assumed to stay in state hands. Of the remaining SOEs, we assume only 50 percent of them are reformed in the five-year period commencing 2016. Our simulation results project SOE reform to increase cumulative baseline real GDP by nearly nine percent in 2035. Under the reform scenario we model, wages for all occupation groups are projected to increase and the SOE reforms are also expected to raise investment by a cumulative peak of 16 percent, relative to the baseline in 2022. The methodology employed in this paper used large-scale modelling to capture macro effects of SOE reform on the Vietnamese economy. It is left to future researchers to examine the micro or firm level behavior of SOE reform.

Appendix A.

Table A1
Sectoral aggregations.

Aggregated GTAP sector	Mapping to GTAP sectors	Major sectors for reporting results	Detailed commodities and services for reporting results
Rice	Paddy rice and processed rice	Agriculture	Rice and other grains
Fishing	Fishing	Agriculture	Fish and livestock
Other grains	Wheat; cereal grains not elsewhere classified (nec); and oil seeds	Agriculture	Rice and other grains
Other agriculture	Vegetables, fruit and nuts; sugar cane and sugar beet; plant-based fibers; crops nec; and fishing	Agriculture	Vegetables, fruit and nut
Livestock	Bovine cattle and sheep; other animal products nec; raw milk; wool, silk-worm cocoons	Agriculture	Fish and livestock
Forestry and wood products	Forestry and wood products	Agriculture	Forestry and wood
Extraction	Coal; oil; gas; and minerals nec; petroleum and coal products; and mineral products nec	Oil, gas and other minerals	Extraction
Meat products	Bovine cattle and sheep products; and other meat products	Manufacturing/Agriculture (including processed food)	Processed food
Food and beverages	Vegetable oils and fats; dairy products; sugar; food products nec; and beverages and tobacco products	Manufacturing/Agriculture (including processed food)	Processed food
Textiles	Textiles	Manufacturing	Textiles, wearing apparel and leather
Wearing apparel and leather products	Wearing apparel and leather products	Manufacturing	Textiles, wearing apparel and leather
Chemicals	Chemical, rubber & plastic	Manufacturing	Chemicals
Metals	Ferrous metals; metals nec; and metal products	Manufacturing	Electronics, machinery and metallic products
Electronic equipment	Electronic equipment	Manufacturing	Electronics, machinery and metallic products
Machinery	Machinery and equipment	Manufacturing	Electronics, machinery and metallic products
Transport equipment	Motor vehicles and parts; and transport equipment nec	Manufacturing	Transport and other manufactures
Other manufactures	Paper products and publishing; and manufactures nec	Manufacturing	Transport and other manufactures
Other services	Electricity; gas manufacture and distribution; water; recreational and other services; and ownership of dwellings	Services	Other services
Construction	Construction	Services	Construction and business services
Finance and insurance	Insurance; finance; and other business services	Services	Construction and business services
Transport	Transport nec; water transport; and air transport;	Services	Trade, transport and communications
Trade and Communications	Trade; and communication	Services	Trade, transport and communications
Government Services	Public administration and defense	Services	Other services

Source: Authors' aggregation of the GTAP database. Note, that agriculture may include processed food if being compared with other data that includes processed food. This reflects differing definitions of these sectors by international and local institutions.

Table A2
Vietnamese state owned enterprises, sales and assets, projected increase in output by sector with a fifty percent restructuring of SOE assets out of the SOE sector.

				Sales			Assets			Projected increase in sales/sector productivity
GTAP code	Aggregated study sectors	Enterprise survey description	Projected asset performance	Total	SOE	SOE to total	Total	SOE	SOE to total	
B_T	Food and beverages	Beverage production	Improvement	1,127,960	117,777	10%	659,735	76,699	12%	0.7%
CNS	Construction	Construction	Improvement	911,703	203,782	22%	1,807,027	432,949	24%	1.1%
ELE	Electronic equipment	Office and computer equipment production	Improvement	766,202	4594	1%	244,134	7641	3%	1.3%
OFI	Finance and insurance	Financial intermediary (excluding insurance and social welfare)	Improvement	428,312	44,685	10%	126,310	50,764	40%	24.9%
FMP	Electronic equipment	Metal products (except machines and equipment)	Improvement	298,492	14,475	5%	349,405	18,355	5%	0.2%
TRD	Trade and communications	Vehicle sales, maintenance and repair; retail sale of gas	Improvement	293,907	8012	3%	175,299	8036	5%	1.0%
CRP	Chemicals	Chemicals and chemical products	Improvement	293,556	74,194	25%	225,961	68,050	30%	3.5%
NMM	Extraction	No improvement-metal mineral products production	Improvement	276,183	74,224	27%	413,061	121,591	29%	1.8%
I_S	Metals	Metal production and processing	Improvement	258,510	32,239	12%	201,852	27,560	14%	0.7%
TEX	Textiles	Textile	Improvement	223,625	17,535	8%	210,636	22,048	10%	1.5%
CRP	Chemicals	Plastic and rubber production and products	Improvement	202,202	13,683	7%	174,800	12,929	7%	0.3%
OTP	Transport	Services in transport; tourist services	Improvement	197,261	68,068	35%	242,841	193,721	80%	111.9%
OTP	Transport	Road, railroad and pipeline transport	Improvement	192,590	44,072	23%	200,661	119,810	60%	45.7%
OTN	Transport equipment	Other means of transportation (boats, railroad, airplane)	Improvement	186,330	21,936	12%	163,674	54,402	33%	16.1%
OMF	Other manufactures	Furniture production and other productions No improvement specified elsewhere	Improvement	161,728	3358	2%	158,348	3504	2%	0.1%
LEA	Wearing apparel, and leather products	Leather tanning and leather products including wallets, seats, suitcases	Improvement	153,625	1132	1%	103,783	938	1%	0.1%
OBS	Finance and insurance	Activities relating real-estate	Improvement	153,404	24,577	16%	22,756	5168	23%	4.3%
MVH	Transport equipment	Motor vehicles and spare parts	Improvement	115,627	7609	7%	87,321	10,124	12%	2.8%
LUM	Forestry and wood products	Wood, bamboo, rattan processing and production of wood, bamboo and rattan products	Improvement	84,521	4405	5%	93,303	5650	6%	0.4%
B_T	Food and beverages	Tobacco production	Improvement	63,812	57,532	90%	43,746	40,851	93%	24.4%
OME	Machinery	Other equipment and machinery No improvement specified elsewhere	Improvement	54,170	2429	4%	60,157	4165	7%	1.3%
ATP	Transport	Airline transport	Improvement	52,473	17,640	34%	249,068	131,718	53%	20.4%
PPP	Other manufactures	Printing and publishing (books, magazines, newspapers, and	Improvement	46,302	15,967	34%	44,705	17,578	39%	3.98.
OBS	Insurance, and business services	Computer-related activities	Improvement	33,538	676	2%	32,129	16,015	50%	47.7%
OFI	Insurance, and business services	Assistance in finance (including social insurance)	Improvement	11,994	1890	16%	337,678	98,125	29%	9.4%

Table A2 (*Continued*)

GTAP code	Aggregated study sectors	Enterprise survey description	Projected asset performance	Sales			Assets			Projected increase in sales/sector productivity
				Total	SOE	SOE to total	Total	SOE	SOE to total	
ROS	Other services	Housework services provided at client's home	Improvement	19	0	0%	20	0	0%	0%
TRD	Trade and communications	Wholesale and agent sales (excluding motor vehicles and motorbikes)	No	4,388,260	1,425,207	32%	2,477,150	710,642	29%	0%
TRD	Trade and communications	Retail sales (excluding motor vehicles and motorbikes);repairs of family appliances	No	819,065	244,134	30%	303,069	39,094	13%	0%
OME	Machinery	Other electronic, electric equipment No improvement specified elsewhere	No	180,323	15,505	9%	126,880	7154	6%	0%
WAP	Wearing apparel, and leather products	Fur processing and fur products (excluding garments)	No	171,905	8861	5%	125,068	5257	4%	0%
CMN	Trade and communications	Post and telecommunications	No	167,528	138,164	82%	2,857,241	433,838	15%	0%
OBS	insurance and business services	Science and technology improvement activities	No	160,310	40,010	25%	1,439,986	112,360	8%	0%
TRD	Trade and communications	Hotel and restaurant (including big and small restaurants, cafe, beverage and drink	No	147,094	30,065	20%	494,039	61,302	12%	0%
P_C	Extraction	Coke, crude oil, uranium processing	No	142,101	130,698	92%	91,317	82,378	90%	0%
PPP	Other manufactures	Paper and paper products	No	109,200	8746	8%	115,497	8436	7%	0%
AGR	Agriculture-only one category applied to Rice and other grains and Vegetables, fruit and nut sectors	Agriculture and relating services (including livestock raising)	No	102,342	82,251	80%	259,002	191,953	74%	0%
WTP	Transport	Water transport	No	94,638	49,109	52%	57,170	7731	14%	0%
ISR	Insurance and business services	Insurance and pensions (excluding social insurance)	No	30,651	13,765	45%	100,676	15,070	15%	0%
FSH	Fishing	Catching and raising sea products, and relating services	No	26,346	11,281	43%	18,808	4925	26%	0%
OBS	Insurance and business services	Other business activities (accounting, tax and other consulting,	No	22,312	7200	32%	3213	29	1%	0%
OMF	Other manufactures	Recycling, reprocessing	No	20,895	14,579	70%	33,638	21,554	64%	0%
OBS	Insurance and business services	Rental of machines and equipment (excluding operators); rental of furniture and houses	No	13,516	2228	16%	39,829	976	2%	0%
FRS	Forestry and wood products	Sylviculture and relating services	No	6704	4600	69%	28,788	9292	32%	0%
ELY	Other services	Electricity, gas, water steam, hot water production and distribution	Strategic	853,579	816,213	96%	1,663,112	1,599,926	96%	0%
OIL	Extraction	Oil and gas drilling and related services, (except: exploring/ searching activities)	Strategic	271,087	140,402	52%	1,856,169	1,646,494	89%	0%

Table A2 (*Continued*)

GTAP code	Aggregated study sectors	Enterprise survey description	Projected asset performance	Sales			Assets			Projected increase in sales/sector productivity
				Total	SOE	SOE to total	Total	SOE	SOE to total	
COA	Extraction	Coal mining	Strategic	260,483	253,463	97%	246,917	240,133	97%	0%
ROS	Other services	Other service activities (laundry, hairdressing, funerals, . . .)	Strategic	143,039	115,090	80%	45	0	0%	0%
OMN	Extraction	Mining for rocks, stone, sand, salt, fertilizer . . .	Strategic	133,419	94,599	71%	187,238	133,323	71%	0%
WTR	Other services	Water exploitation, purification, and distribution	Strategic	32,177	28,974	90%	100,922	90,988	90%	0%
ROS	Other services	Cultural and sport activities (broadcasting, television, cinema, recreation and entertainment)	Strategic	18,004	1802	10%	41	1	2%	0%
OMN	Extraction	Metal mining	Strategic	17,815	4641	26%	38,921	9667	25%	0%
OSG	Government Services	Education and training	Strategic	15,211	43	0%	22,281	338	2%	0%
OSG	Government Services	Health and social relief (hospitals, health centers, veterinary care, social relief,	Strategic	13,012	107	1%	68,129	3310	5%	0%
OSG	Government Services	Government administration and national defense; promulgated social insurance	Strategic	5486	73	1%	33,935	1809	5%	0%
OSG	Government Services	Disposal collection, public sanitation improvement, and similar activities	Strategic	171	133	78%	119,134	78,413	66%	0%
ROS	Other services	Communist party, mass organizations, professional associations	Strategic	7	1	14%	396	262	66%	0%

Source: Vietnam Enterprise Survey (2008–2013) provided by the World Bank Group and authors' compilations.

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