

Vietnam: The Next Asian Tiger?

Tom Barker¹, Murat Üngör²

¹Macro Financial Department
Reserve Bank of New Zealand

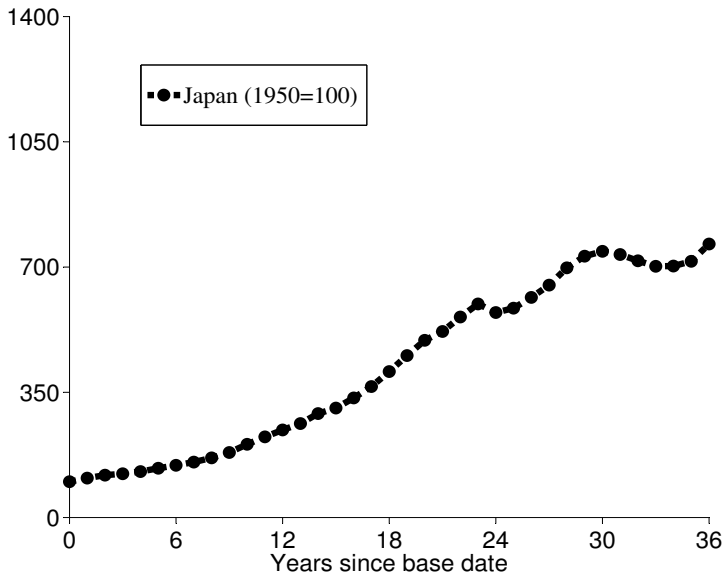
²Department of Economics
University of Otago

3 July 2018

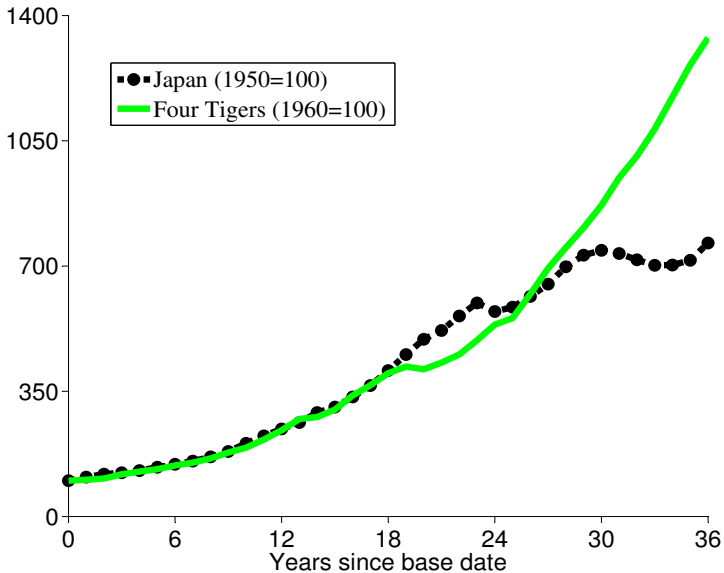
The views expressed in this paper are those of the authors and do not necessarily reflect the views of the Reserve Bank of New Zealand.



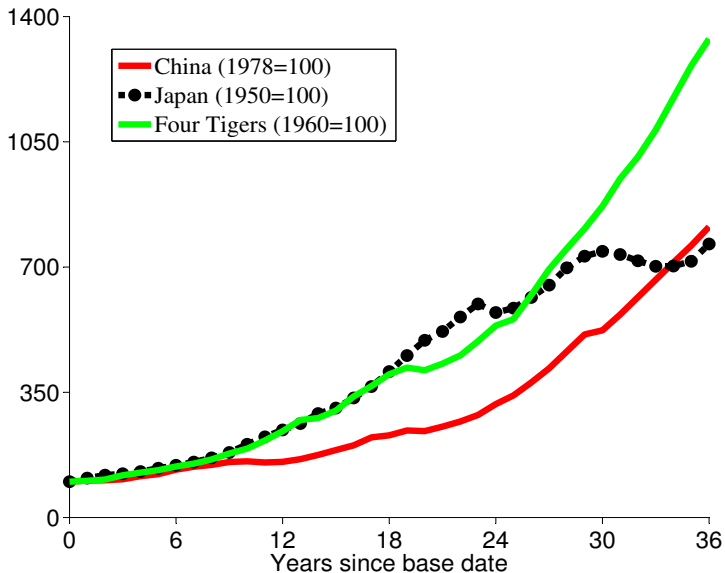
Real GDP per capita indices



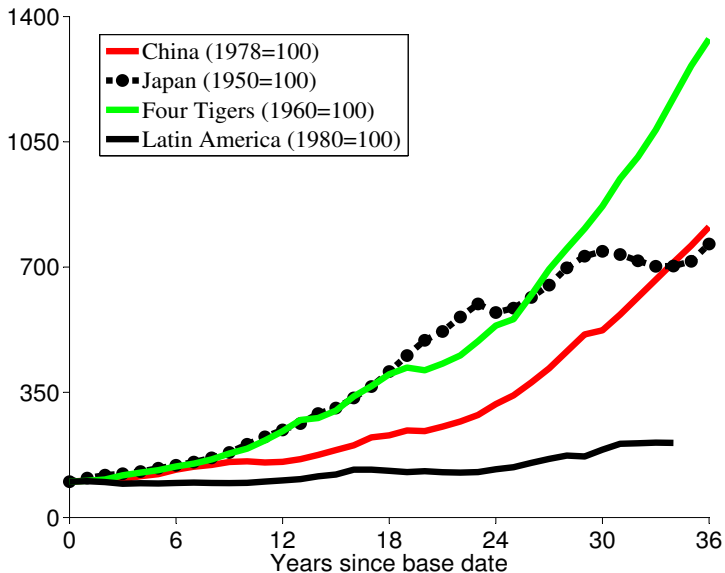
Real GDP per capita indices



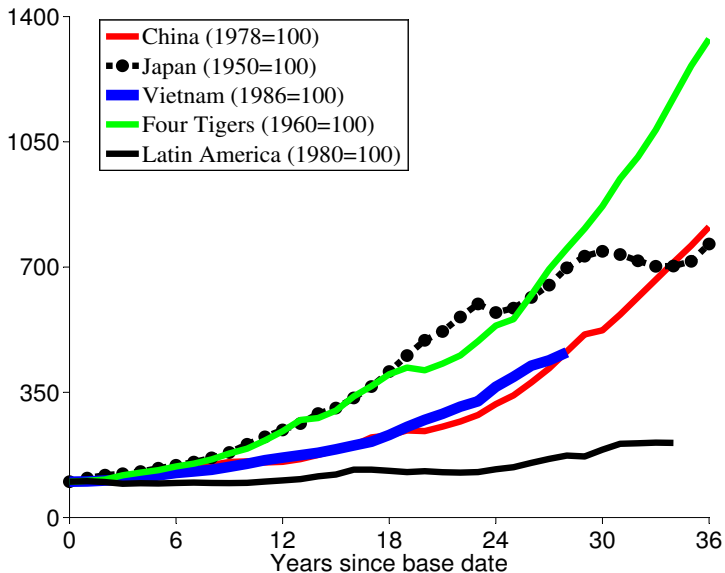
Real GDP per capita indices



Real GDP per capita indices



Real GDP per capita indices



This paper

- ▶ This is the first detailed study conducted on Vietnam's convergence experience using newly available data from the Penn World Table (PWT) version 9.0.
- ▶ This is the first study to employ a two-sector general equilibrium model of structural transformation looking at the sectoral allocation of Vietnam's production factors and the subsequent implications for aggregate productivity with alternative counterfactual experiments.

Findings

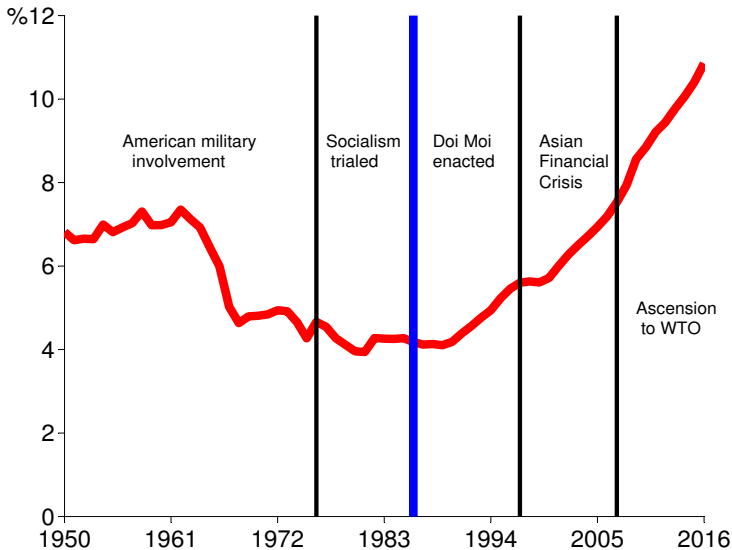
- ▶ Vietnam has grown impressively since 1986, but is still a relatively poor country in absolute terms.
- ▶ The improvement in GDP per capita since *Doi Moi* can largely be attributed to progress made in labour productivity.
- ▶ Vietnam's expansion has occurred with a notable absence of technological advancement since 1997. Given this fact, past rates of economic growth are unlikely to be sustained if they fail to improve their productive capacity and technological proficiency.
- ▶ A negative contribution from the TFP component acted as a headwind to growth in output per worker during 1997-2014. There was a positive TFP growth before *Doi Moi* and a negative TFP growth after the first decade of *Doi Moi*.

Findings

- ▶ Growth in agricultural labour productivity plays a more important role than growth in non-agricultural labour productivity in Vietnam's deagriculturalization experience.
- ▶ A significantly higher growth in aggregate labour productivity would have been accomplished by feeding both sectors' productivity growth rates observed in China.
- ▶ The findings of our counterfactual experiments regarding the aggregate labour productivity growth in Vietnam can be considered in line with Johnston and Mellor (1961, p. 590): “[I]t is our contention that ‘balanced growth’ is needed in the sense of simultaneous efforts to promote agricultural and industrial development”.

An overview of the Vietnamese economy

Real GDP per capita relative to the U.S. (%)



Peer Countries



Peer Countries

China

- ▶ as the paragon emerging economy



Peer Countries

China

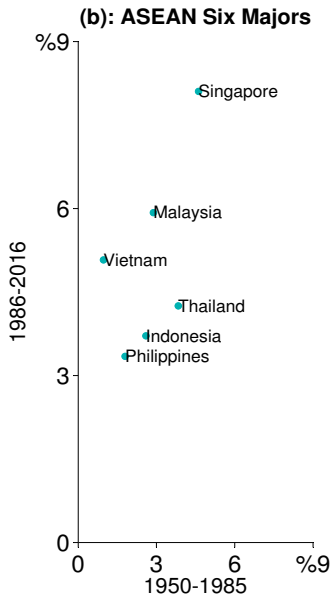
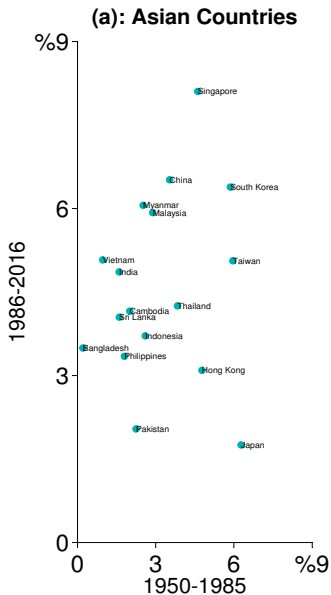
- ▶ as the paragon emerging economy

ASEAN “Majors”

- ▶ ASEAN is a political and economic organisation of ten Southeast Asian countries established in 1967.
- ▶ The “Majors” refers to the six largest economies in the area: Indonesia, Thailand, Malaysia, the Philippines, Singapore, and Vietnam.



A comparison of GDP per capita growth in Asia



Delving into GDP per capita

Decomposing GDP per capita

$$\underbrace{(Y/P)_t}_{\text{GDP per capita}} = \underbrace{(Y/L)_t}_{\text{Labour productivity}} \times \underbrace{(L/WP)_t}_{\text{Employment rate}} \times \underbrace{(WP/P)_t}_{\text{Demographics}}$$

Taking logarithms of both sides allows us to decompose the average annual growth rate of output per capita over z years (from time t to time $t+z$), where \ln is the natural logarithm operator:

$$\frac{\ln\left(\frac{Y}{P}\right)_{t+z} - \ln\left(\frac{Y}{P}\right)_t}{z} = \frac{\ln\left(\frac{Y}{L}\right)_{t+z} - \ln\left(\frac{Y}{L}\right)_t}{z} + \frac{\ln\left(\frac{L}{WP}\right)_{t+z} - \ln\left(\frac{L}{WP}\right)_t}{z} + \frac{\ln\left(\frac{WP}{P}\right)_{t+z} - \ln\left(\frac{WP}{P}\right)_t}{z}.$$

GDP per capita decomposition in Vietnam

Period	<i>Average annual changes, %</i>			
	<i>Y/P</i>	<i>Y/L</i>	<i>L/WP</i>	<i>WP/P</i>
1970-1985	2.5	1.5	0.4	0.6
1986-2014	5.0	4.1	0.01	0.8
1970-2014	4.0	3.1	0.2	0.7

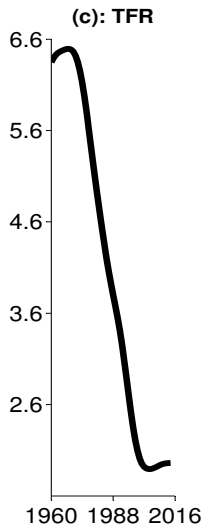
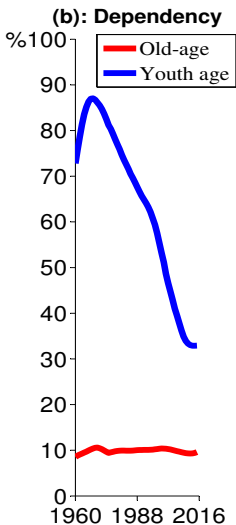
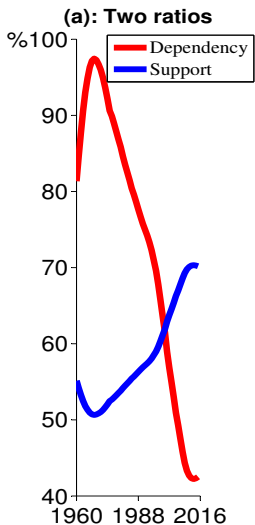
Source: PWT 9.0 and WDI (World Bank, 2017).

- ▶ During 1970-1985, per capita income grew at 2.5% per year and output per worker increased 1.5% per year.
 - ▶ The expansion in output per worker made up 61.2% of the increase in per capita income between 1970 and 1985.
- ▶ GDP per capita grew 5.0% per year on average over the 1986-2014 period.
 - ▶ Labour productivity improvements accounted for 83.0% of this growth.

Demographic dynamics in Vietnam

- ▶ Vietnam is currently enjoying a golden population structure, in which the working age population is nearly double the dependent population.
- ▶ The percentage of the population aged between 15 and 64 rose from around 56% in 1986 to slightly over 70% in 2014.
- ▶ This is reflected in our results, with an increase in the working-age population to total population ratio contributing roughly 15% of GDP per capita growth, on average, between 1986 and 2014.
- ▶ This positive contribution is known as the “demographic dividend,” or demographics that promote economic growth (see Bloom et al., 2010).

Demographic dynamics in Vietnam, 1960-2015



A comparison: GDP per capita decomposition (in PPP)

1970-1985					1986-2014				
	Average annual changes, %					Average annual changes, %			
Country	Y/P	Y/L	L/WP	WP/P	Country	Y/P	Y/L	L/WP	WP/P
Vietnam	1.9	1.0	0.4	0.6	Vietnam	5.6	4.7	0.01	0.8
ASEAN	4.2	3.1	0.5	0.6	ASEAN	4.4	4.0	-0.1	0.5
China	3.8	2.3	0.6	0.9	China	6.0	5.6	-0.2	0.5

Source: PWT 9.0 and WDI (World Bank, 2017).

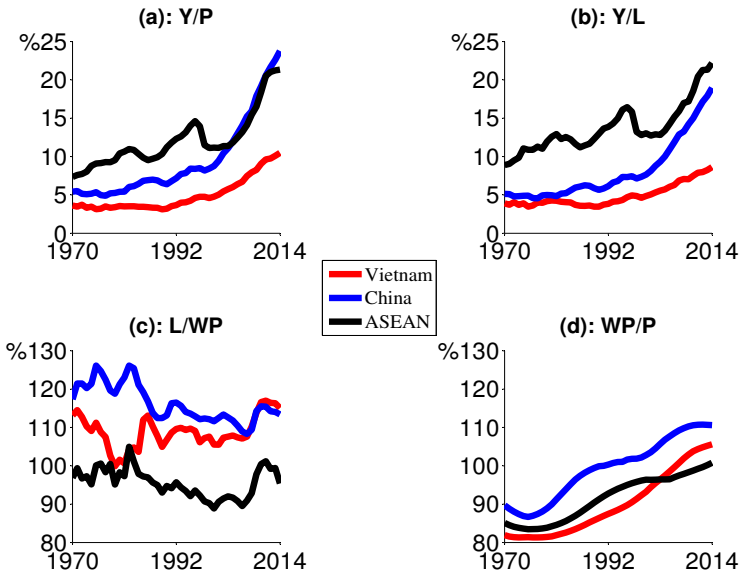
- ▶ Vietnamese GDP per capita expanded at an average annual rate of just 1.9% between 1970 and 1985. This was a poor performance when compared to their East Asian counterparts.
- ▶ After the implementation of *Doi Moi* in 1986, Vietnam embarked on a high growth period.
- ▶ During 1986-2014, annual GDP per capita expanded at an average annual rate of 5.6%. This made Vietnam the best performer out of the *ASEAN Six Majors*.

Convergence Exercise

$$\frac{(Y/P)_t^{\text{Vietnam}}}{(Y/P)_t^{\text{US}}} = \frac{(Y/L)_t^{\text{Vietnam}}}{(Y/L)_t^{\text{US}}} \times \frac{(L/WP)_t^{\text{Vietnam}}}{(L/WP)_t^{\text{US}}} \times \frac{(WP/P)_t^{\text{Vietnam}}}{(WP/P)_t^{\text{US}}}$$

- ▶ In 1977, China and Vietnam had similarly poor levels of labour productivity; 4.0% and 4.6% of the U.S. level, respectively.
- ▶ The remarkable convergence of China is visible, with labour productivity reaching 19.0% of the U.S. level by 2014. At 8.6% of the U.S. productivity level in 2014, Vietnam's labour force is the least productive compared to China and the *Majors*.
- ▶ The working-age population to total population ratio in Vietnam consistently rises since the late 1970s in relation to the U.S. This is evidence of the aforementioned "demographic dividend."

GDP per capita components relative to the U.S.



An investigation of the Vietnamese productivity

Growth accounting

Consider the following aggregate production function:

$$Y_t = A_t K_t^\alpha (hE)_t^{1-\alpha}$$

In per-worker terms the production function can be rewritten as:

$$y_t = A_t k_t^\alpha h_t^{1-\alpha}$$

Taking logarithms of the terms and decomposing the average annual growth rate of output per worker over z years (from time t to time $t + z$) yields:

$$\frac{\ln y_{t+z} - \ln y_t}{z} = \frac{\ln A_{t+z} - \ln A_t}{z} + \alpha \frac{\ln k_{t+z} - \ln k_t}{z} + (1 - \alpha) \frac{\ln h_{t+z} - \ln h_t}{z}$$

Decomposing Vietnam's growth: 1970-2014

<i>Period</i>	Growth (%)				Contributions (%)			
	<i>y</i>	<i>A</i>	<i>k</i>	<i>h</i>	<i>y</i>	<i>A</i>	<i>k</i>	<i>h</i>
1970-1985	1.5	1.2	-0.3	0.6	100	81.0	-17.4	36.3
1986-1996	4.0	1.1	2.6	0.3	100	27.2	66.1	6.7
1997-2014	4.0	-0.7	3.7	1.0	100	-17.4	92.9	24.5
1970-2014	3.1	0.4	2.1	0.6	100	12.5	66.8	20.7

Source: PWT 9.0. Note: $\alpha = 0.5$.

- ▶ For the pre-1986 period, there was no capital deepening.
- ▶ TFP growth accounted for more than four-fifth of the growth of output per worker between 1980 and 1985.
- ▶ Post-1986, the economic fortunes of Vietnam changed considerably.
- ▶ In the post-1986 period, growth has been mainly coming from increases in both physical and human capital rather than increases in TFP.

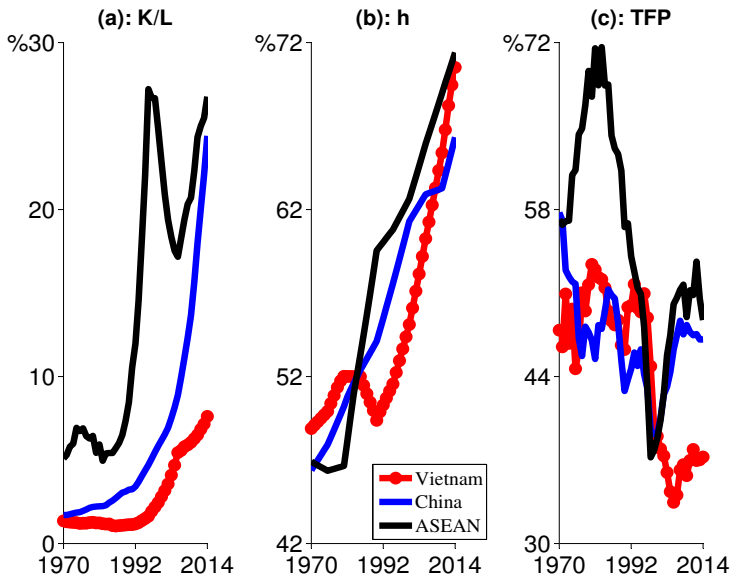
Labour productivity components relative to the U.S.

Expressing country i 's performance relative to that of the U.S. leads to the following re-write labour productivity:

$$\frac{y_t^i}{y_t^{US}} = \frac{A_t^i}{A_t^{US}} \times \left(\frac{k_t^i}{k_t^{US}} \right)^\alpha \times \left(\frac{h_t^i}{h_t^{US}} \right)^{1-\alpha},$$

- ▶ In 1970, TFP in Vietnam was 47.9% of the U.S. level. It increased to 53.4% of the U.S. level in 1980 and decreased to 48.7% of the U.S. level in 1986.
- ▶ In 2014, TFP in Vietnam was 37.3% of the U.S. level.
- ▶ TFP in China was 47.1% of the U.S. level in 2014 and the corresponding figure for the ASEAN group was 48.1% in that year.

Labour productivity components relative to the U.S.(%)



Conventional measure of human capital

- ▶ Human capital is proxied by years of schooling (and returns to education).
- ▶ Data are from PWT 9.0. PWT 9.0 follows the procedure implemented by Hall and Jones (1999) and Caselli (2005).
- ▶ Specifically, data on average years of schooling are converted into human capital, using the formula $h = \varphi(s)$, where s is average years of schooling, and the function $\varphi(s)$ is piecewise linear and is defined as:

$$\varphi(s) = \begin{cases} 0.134 \times s, & \text{if } s \leq 4, \\ 0.134 \times 4 + 0.101 \times (s - 4), & \text{if } 4 < s \leq 8, \\ 0.134 \times 4 + 0.101 \times (s - 4) + 0.068(s - 8), & \text{if } s > 8. \end{cases}$$

Average scores of 15-year-old students in the PISA 2012

	Mathematics	Reading	Science	Average	Relative to the U.S.
Shanghai - China	613	570	580	588	1.19
Indonesia	375	396	382	384	0.78
Malaysia	421	398	420	413	0.84
Singapore	573	542	551	555	1.13
Thailand	427	441	444	437	0.89
Vietnam	511	508	528	516	1.05
U.S.	481	498	497	492	1.00
OECD average	494	496	501	497	1.01

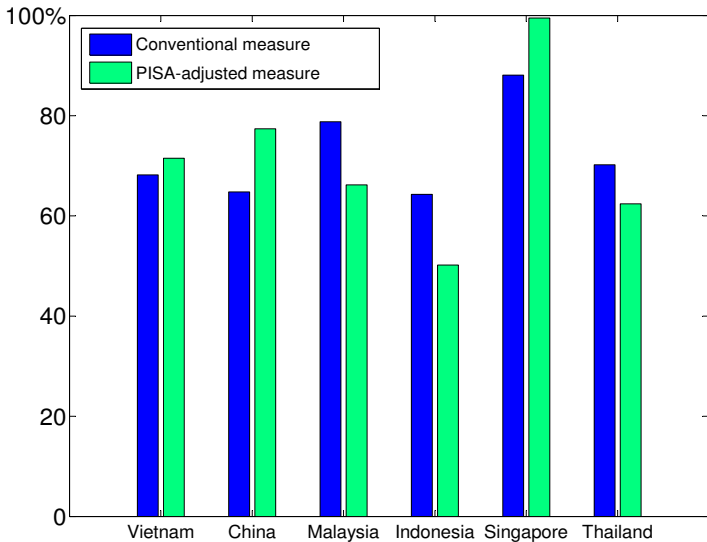
Source: OECD, PISA 2012 (<http://www.oecd.org/pisa/>).

Adjusted human capital

We extend the usual Mincer model that considers only years of schooling to one that additionally considers PISA score performance and suggest the following measure of human capital for 2012:

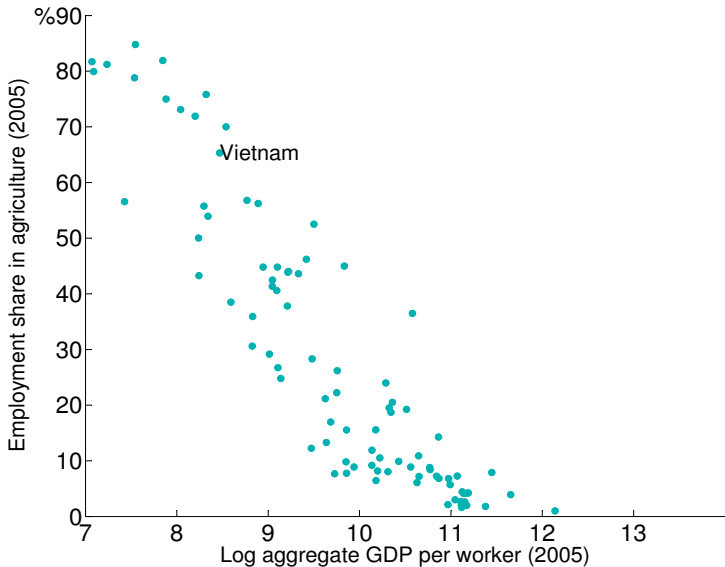
$$\underbrace{\frac{h_i^*}{h_{US}^*}}_{\text{Considering years of schooling and PISA scores}} = \underbrace{\frac{h_i}{h_{US}}}_{\text{Considering only years of schooling}} \times \underbrace{\frac{PISA_i}{PISA_{US}}}_{\text{Pisa scores}}$$

Human capital relative to the U.S. in 2012 (%)

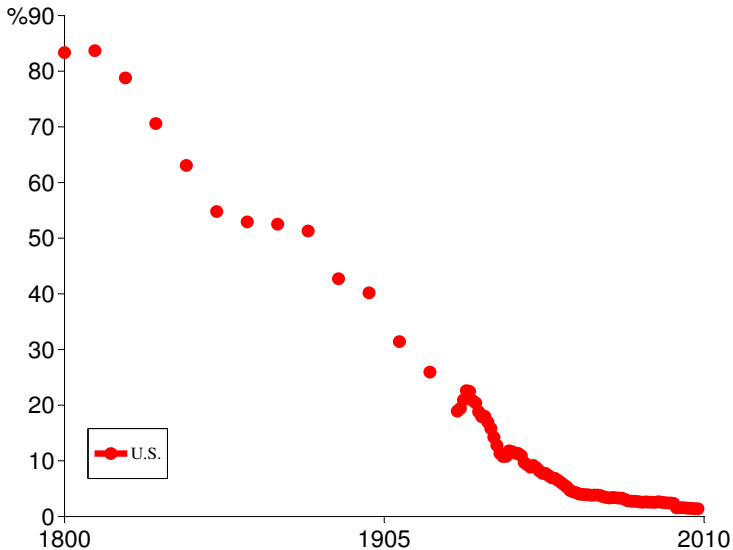


Can we learn more about the
role of productivity by
examining the sectoral data?

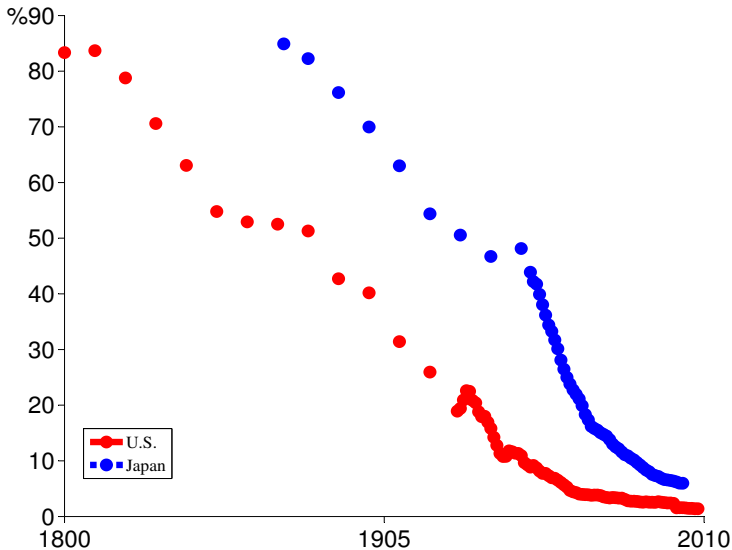
Employment share in agriculture vs GDP per worker



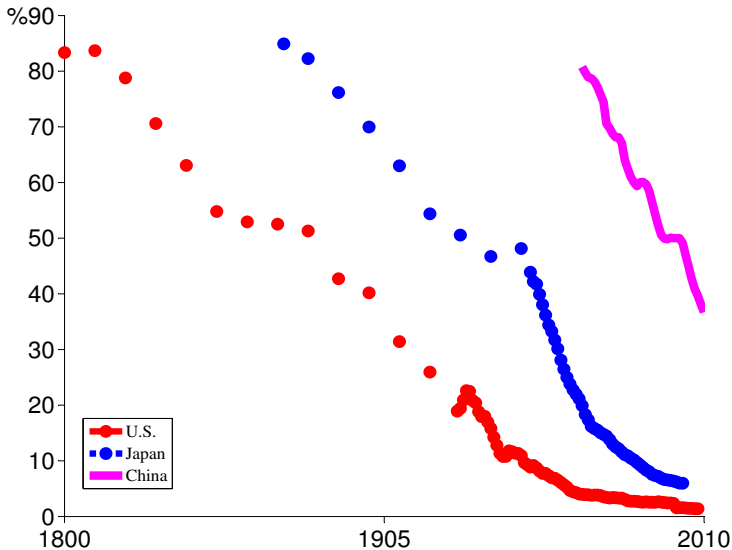
Deagriculturalization: Historical comparisons



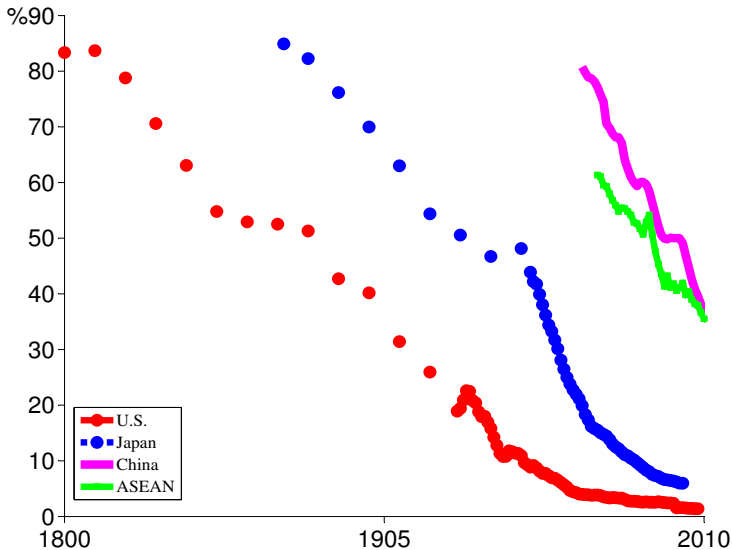
Deagriculturalization: Historical comparisons



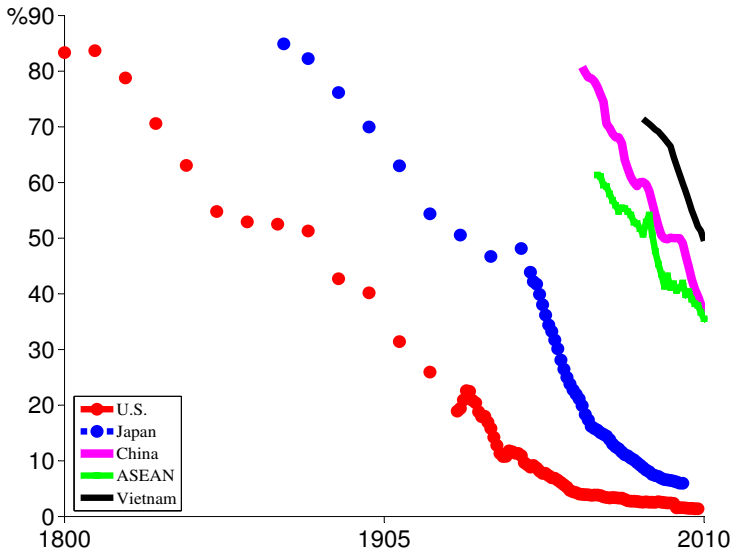
Deagriculturalization: Historical comparisons



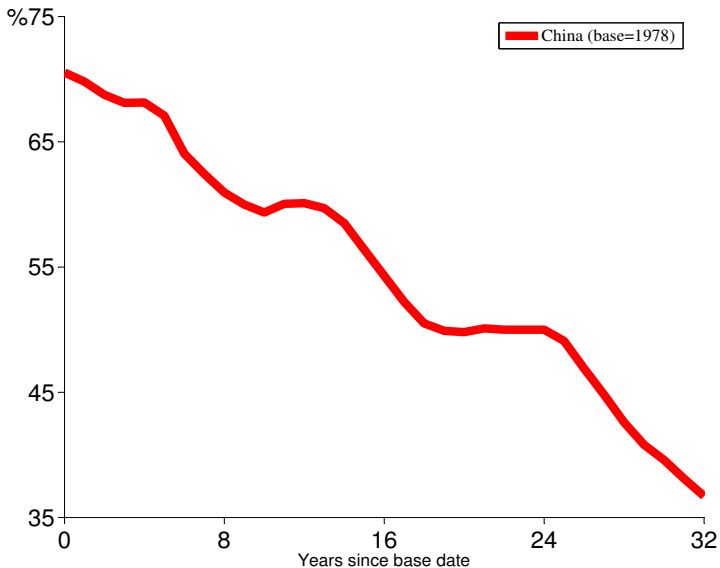
Deagriculturalization: Historical comparisons



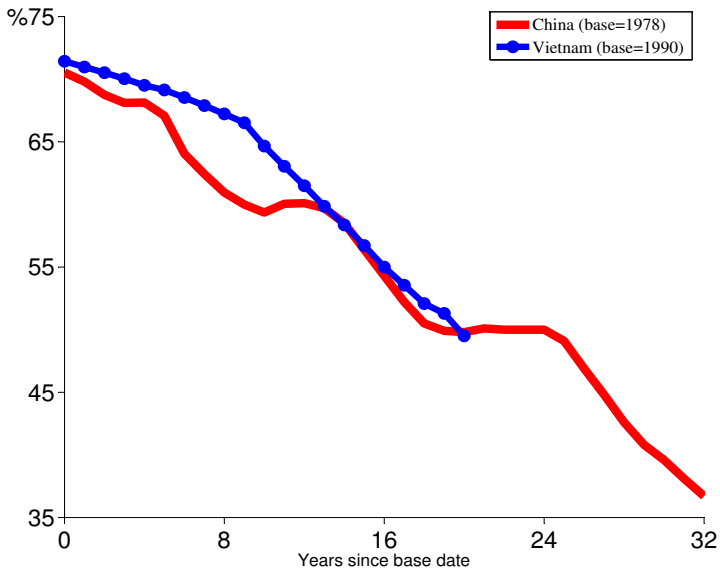
Deagriculturalization: Historical comparisons



Deagriculturalization: A comparison with China



Deagriculturalization: A comparison with China



Driving forces of deagriculturalization

- ▶ Labour Push:

Improvements in agricultural productivity release resources from agriculture.

- ▶ Labour Pull:

Improvements in non-agricultural technology attract labour out of agriculture.

We investigate if it is rising productivity in agriculture or non-agriculture (or both) that is responsible for the pace of deagriculturalization and overall productivity in Vietnam.

We examine

- ▶ If the pace deagriculturalization of the Vietnamese economy is due to productivity growth in agriculture or non-agriculture or both
- ▶ Counterfactual: What would have happened to aggregate productivity if the Vietnamese economy had
 - ▶ productivity in agriculture same as China
 - ▶ productivity in both sectors same as China

A Two-Sector Model

- ▶ At each date there are two goods produced by two sectors agriculture (A) and non-agriculture (call it industry, I). The production function for sector j is given by

$$Y_{j,t} = \theta_{j,t} N_{j,t} \quad (1)$$

- ▶ The instantaneous utility is defined over the composite consumption good (C_t), which is derived from agriculture and non-agriculture

$$C_t = \left(\gamma_A^{1/\eta} (A_t - \bar{A})^{(\eta-1)/\eta} + \gamma_I^{1/\eta} I_t^{(\eta-1)/\eta} \right)^{\eta/(\eta-1)} \quad (2)$$

- ▶ \bar{A} represents the subsistence level of food consumption and satisfies

$$\theta_{A,t} > \bar{A} > 0 \quad (3)$$

- ▶ At each date, and given prices, the household chooses consumption of each good to maximize his lifetime utility subject to the budget constraint

$$p_{A,t}A_t + p_{I,t}I_t = 1 \quad (4)$$

- ▶ Markets clear in equilibrium

$$A_t = Y_{A,t}, \quad I_t = Y_{I,t} \quad (5)$$

- ▶ The equilibrium employment share in agriculture is given by:

$$N_{A,t} = \left(\frac{\gamma_A \theta_{A,t}^{\eta-1}}{\gamma_A \theta_{A,t}^{\eta-1} + \gamma_I \theta_{I,t}^{\eta-1}} \right) + \left(\frac{\gamma_I \theta_{I,t}^{\eta-1}}{\gamma_A \theta_{A,t}^{\eta-1} + \gamma_I \theta_{I,t}^{\eta-1}} \right) \frac{\bar{A}}{\theta_{A,t}}$$

- ▶ η determines the amount of substitution between agricultural and industrial goods

Quantitative Analysis

Data

Our sample period is between 1990 and 2013, since there is no publicly available data on employment and GDP by sector prior to 1990 even at a high level of aggregation.

This point is also made by McCaig and Pavcnik (2013).

Data are from the Asian Productivity Database (30 September 2015 version) (APO, 2015).

Although this is only a 24-year period, Vietnam's employment share in agriculture fell from 71.4 to 46.8% over this time.

Calibration

We calibrate the model to the Vietnamese data.

All series are de-trended using the Hodrick-Prescott filter with a smoothing parameter of 6.25 before any ratios are computed.

We normalize the level of labour productivity in both sectors to one in 1990, that is, $\theta_{A,1990} = \theta_{I,1990} = 1$.

We need the values of the following four parameters in our model: γ_A , γ_I , η , and \bar{A} .

Calibration

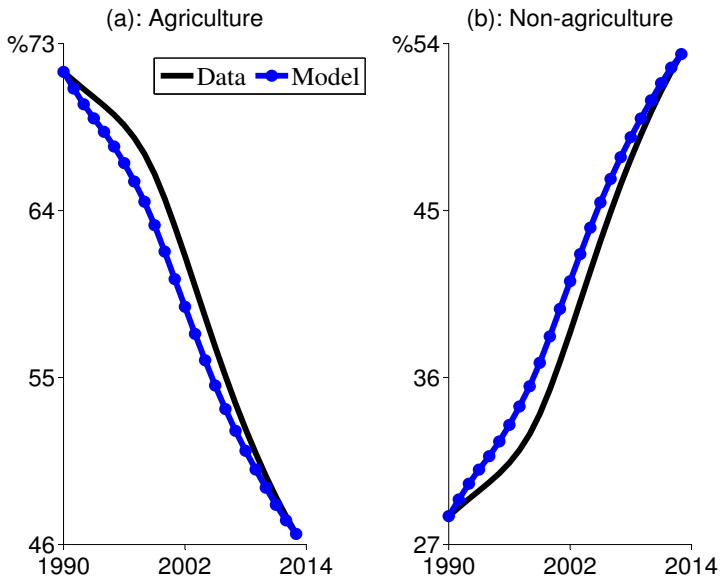
For a given value of η , we jointly determine the value of γ_A , γ_I , and \bar{A} to match the following set of statistics of the Vietnamese data:

1. the employment share in agriculture in 1990;
2. the employment share in non-agriculture in 1990;
3. the aggregate labour productivity growth between 1990 and 2013.

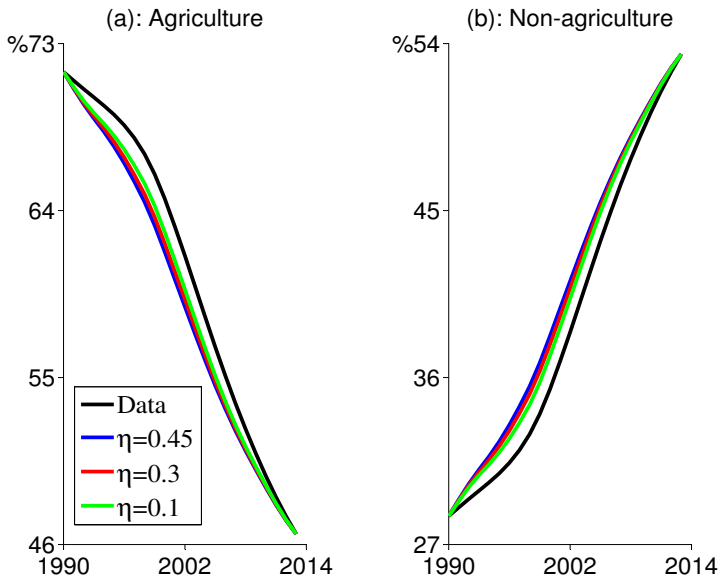
We set $\eta=0.45$ following the structural transformation literature.

Then we determine the values for the remaining three parameters; $\gamma_A = 0.4982$, $\gamma_I = 0.5018$, and $\bar{A} = 0.4104$.

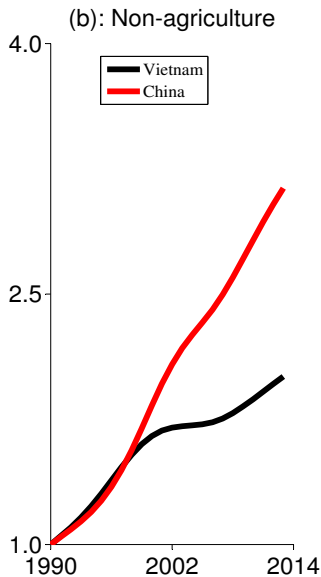
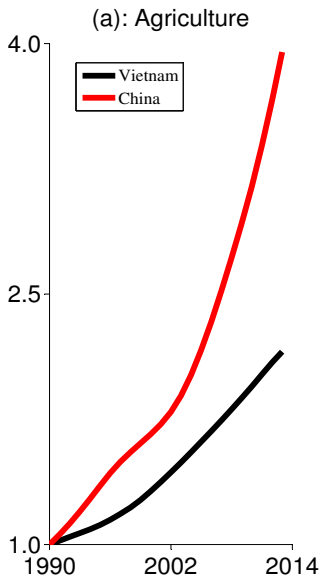
Benchmark results: Sectoral employment shares



Sensitivity: Sectoral employment shares



Sectoral productivity differences, China versus Vietnam



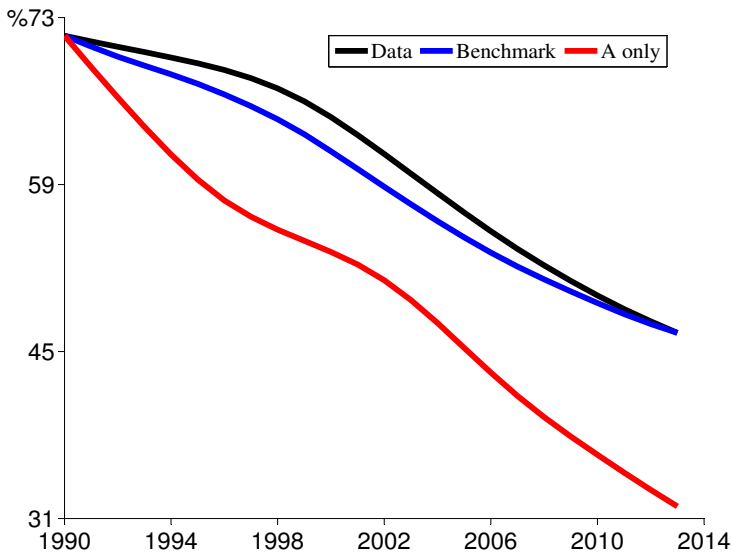
Counterfactuals

The success of the benchmark model motivates several counterfactual experiments to further investigate the structural transformation experience of Vietnam.

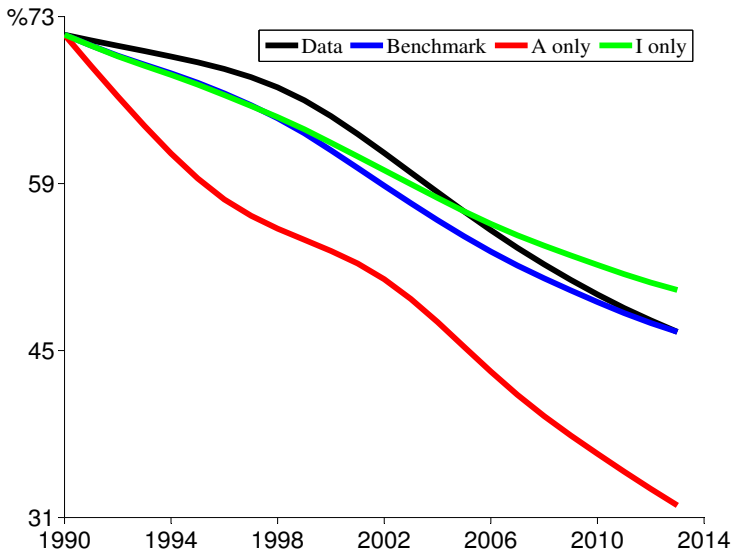
We use the model to assess the quantitative role of sectoral labour productivity growth rates in the behaviour of (i) employment share in agriculture; and (ii) aggregate labour productivity in Vietnam.

To do so, we perform a series of counterfactual experiments whereby we replace observed sectoral labour productivity growth rates in a sector with the ones observed in China.

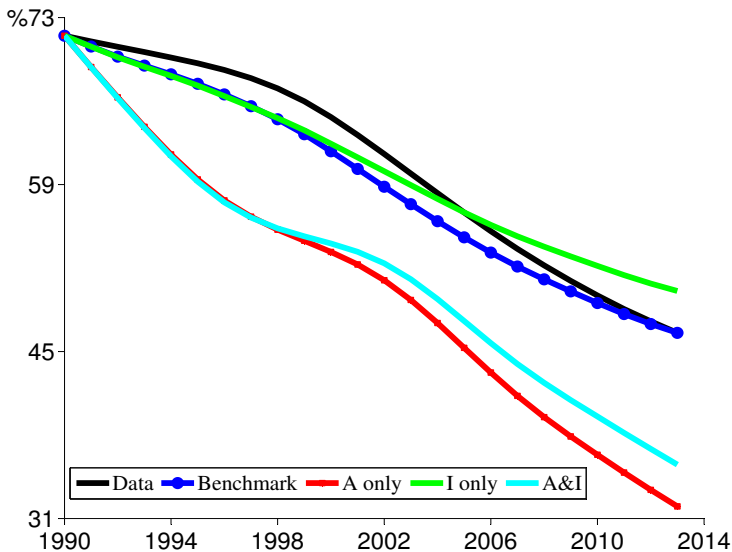
Counterfactuals: Employment share in agriculture



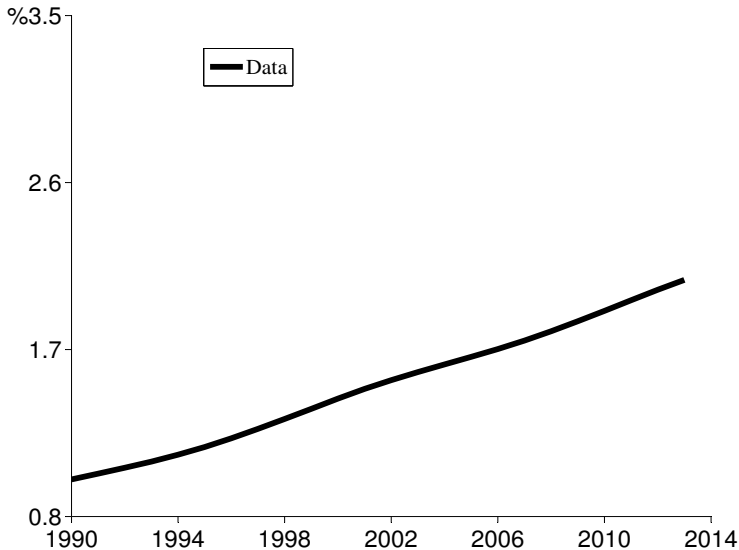
Counterfactuals: Employment share in agriculture



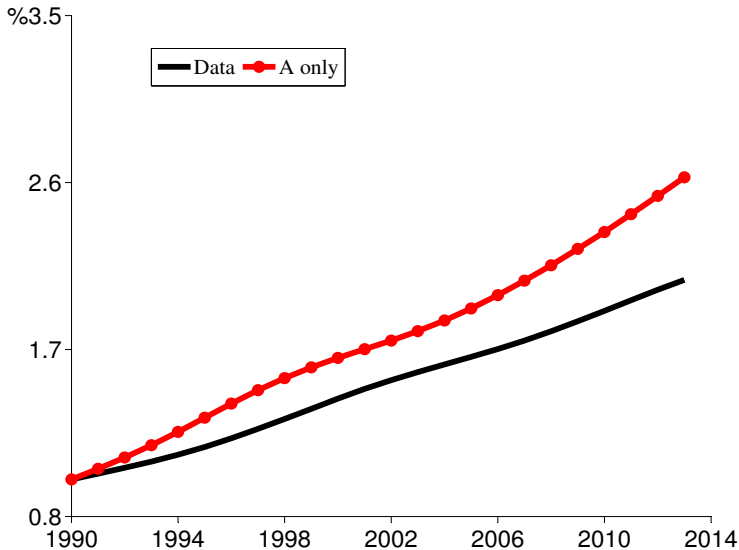
Counterfactuals: Employment share in agriculture



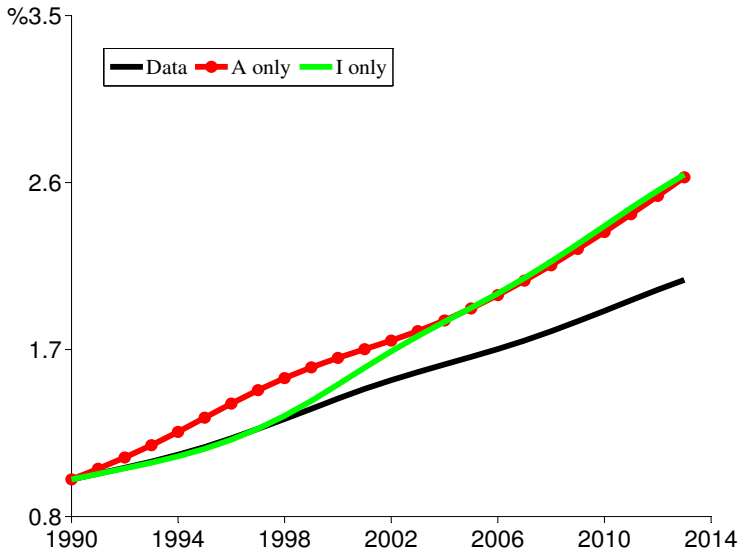
Aggregate labour productivity in Vietnam (1990=1)



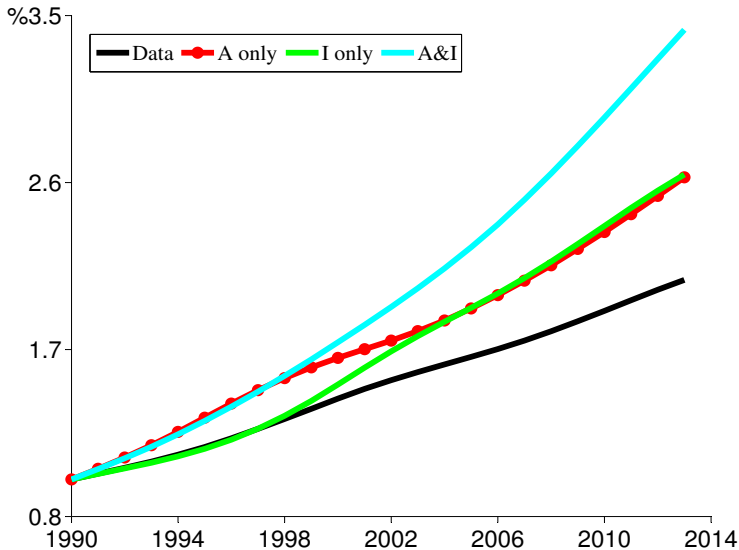
Aggregate labour productivity in Vietnam (1990=1)



Aggregate labour productivity in Vietnam (1990=1)



Aggregate labour productivity in Vietnam (1990=1)



Estimates of distortions to agricultural incentives

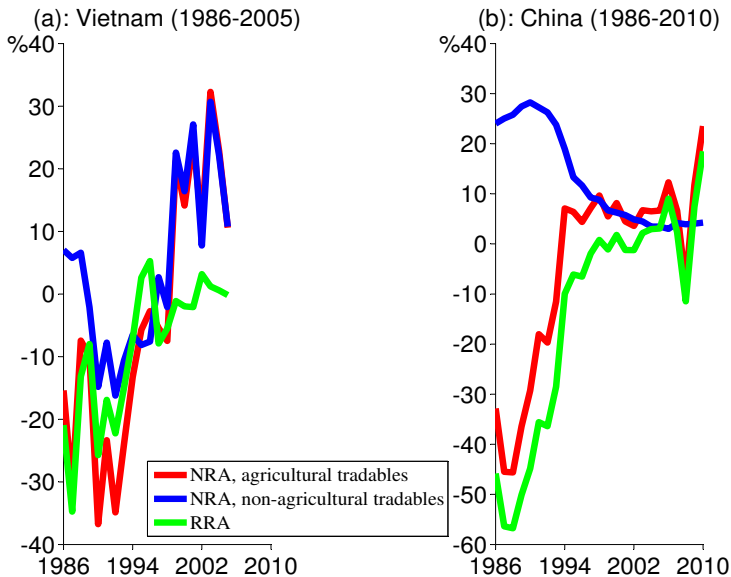
- ▶ Focuses on government imposed distortions that create a gap between the domestic price and what they would be under free markets.
- ▶ NRA (Nominal Rate of Assistance): the percentage by which government policies have raised gross returns to farmers above what they would be without the governments intervention (or lowered them, if $NRA < 0$).
- ▶ RRA (Relative Rate of Assistance):

$$RRA = 100 * \left[\frac{100 + NRA_t^{ag}}{100 + NRA_t^{nonag}} - 1 \right],$$

where NRA_t^{ag} is the NRA to producers of tradables in the agricultural sector, and NRA_t^{nonag} is the NRA to producers of tradables in the non-agricultural sector.

If the RRA is below (above) zero, a country's policy regime has an anti-(pro-) agricultural bias.

Evolution of agricultural distortions



Evolution of agricultural distortions

- ▶ The policy regime in Vietnam was characterized by a significant bias against agriculture between 1986 and 1993.
- ▶ The RRA averaged 21% during 1986-1989 and 22% during 1990-1993.
- ▶ These RRA values suggest that farmers received, on average, less than 80% of the prices they would have received had markets for both farm and non-farm goods been free between 1986 and 1993.
- ▶ An agricultural bias remained in the post-Asian crisis, but it is small relative to the corresponding bias that prevailed between 1986 and 1994. Vietnam's agriculture has become much less distorted since then. Farmers in Vietnam received slightly positive assistance, with an average RRA of 1.2% between 2002 and 2005.

Conclusions and policy suggestions

- ▶ Vietnam must decrease its reliance on factor accumulation as its source of growth and increase its technological capabilities.
- ▶ Economic policies should equally target both agricultural and nonagricultural sectors to increase sectoral productivity growth rates in Vietnam.
- ▶ Our findings suggest that the problem of convergence in Vietnam is broad-based and research and policy making should place the emphasis on an economy-wide explanation rather idiosyncratic factors.
- ▶ Although promising signs, Vietnam's government must build on these foundations in order to avoid slipping into the so-called middle-income trap.