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The Effects of AFTA on Macroeconomic Variables and Poverty: Evidence of Laos

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Outline of Presentation

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Problem Statement

- Globalization-Trade liberalization gains dynamic in Asia region (AFTA, ASEAN⁺³, ASEAN^{+EU}, ASEAN^{+Indi}).
- Trade is important to stimulate economic growth (Winter, 2004; Dollar, 1992; Frankel and Rose, 1999).
- However, there are still some questions as to whether or not trade liberalization is good for poor households.

Problem Statement

The impact of trade on poverty is complex

- Consumer price
- Producer price
- Wage
- Spending and income

Problem Statement

- Trade liberalization is the key to promoting growth and reducing poverty (GoL, 2004).
- Laos has joined AFTA in 1998 and move forward to AEC by 2015.
- The effect of trade liberalization on poverty and income distribution is still being debated in Laos.
- Due to limited research on these issues, the impact of trade liberalization is still not clear.

Research Questions

- How does trade liberalization (AFTA) affect Lao economy ?
- Does trade liberalization improve welfare?
- What are the factors affect welfare loss and again of household?

Lao Economy and Poverty

Macroeconomic Indicators

Macroeconomic indicator	2006–2011	2001–2005	1996–2000	1990–1995
Population (million persons)	6.07	5.58	5.12	4.49
Population growth (%)	1.48	1.58	2.07	2.71
GDP (current million US\$)	5,739	2,130	1,617	1,276
GDP growth (%)	8.02	6.24	6.17	6.28
GDP per capita (constant 2000 US\$)	509	371	302	243
GDP per capita growth (%)	6.43	4.58	4.00	3.44
Money supply (M2) (million US\$)	1,783	409	271	148
Money supply growth (%)	29.87	20.18	66.04	30.92
Inflation, CPI (%)	5.42	10.31	57.00	15.27

Lao Economy and Poverty

Poverty

	LECS 1 1992/93	LECS 2 1997/98	LECS 3 2002/03	LECS 4 2007/8
Laos	46	39.1	33.5	28
Urban	27	22	20	17
Rural				
with road	43	32	31	30
without road	61	51	46	43
Lowland			28	20.5
Midland			36.5	29
Upland			34	33

Source: World Bank and DOS (2009).

Note: LECS (Lao Expenditure and Consumption Census).

Lao Economy and Poverty

Inequality (Gini)

	LECS 1 1992/93	LECS 2 1997/98	LECS 3 2002/03	LECS 4 2007/08
Laos	30.5	34.9	32.6	35.4
Urban	30.9	39.7	34.8	36.3
Rural				
with road	29.3	32.1	30.3	33.2
without road	27.5	30.9	29.4	33.3
Region				
Vientiane	29.7	36.9	36	38
North	26.9	34.5	30.7	35.2
Central	31.5	32.5	31	34
South	32.3	32.4	31.4	32.2

Source: World Bank and DOS (2009).

Note: LECS (Lao Expenditure and Consumption Census).

International Trade - Import

	2004	2008
Australia, New Zealand	1.87	1.20
Cambodia	0.06	0.00
East Asia	11.91	17.64
European Union 25	13.54	6.50
Indonesia	0.20	0.24
Latin America	0.26	0.10
Malaysia	0.29	0.62
Middle East and North Africa	0.95	0.10
North America	2.66	1.49
Philippines	0.03	0.03
Rest of Southeast Asia	0.01	0.01
Singapore	5.10	0.44
South Asia	0.44	0.27
Sub-sahara Africa	1.43	0.22
Thailand	53.67	66.06
Vietnam	5.70	4.16
Rest of the world	1.85	0.91
Total	100.00	100.00

International Trade - Export

	2004	2008
Australia, New Zealand	0.64	0.78
Cambodia	0.05	0.01
East Asia	7.11	15.75
European Union 25	46.29	24.65
Indonesia	0.14	0.38
Latin America	0.97	1.01
Malaysia	0.16	2.49
Middle East and North Africa	2.34	0.50
North America	11.16	7.67
Philippines	0.05	0.07
Rest of Southeast Asia	0.00	0.01
Singapore	0.53	0.50
South Asia	0.39	0.78
Sub-sahara Africa	0.55	0.93
Thailand	15.79	27.87
Vietnam	10.63	13.31
Rest of the world	3.20	4.06
Total	100.00	100.00

Literature Reviews

Trade liberalization and poverty (CGE model)

- Cororation et al.(2005) investigate the impact of Doha scenarios and trade reforms on poverty in the Philippines. This research found that poverty increased slightly.
- Ianchovichina and Martin (2001) analyze China's WTO accession. They found that Chinese households will gain about 2.2% of their income.
- Fujii and Roland-Holst (2007) combined an integrated microsimulation-CGE model to evaluate the spatial incidence of poverty from Vietnam's accession to the WTO. Full liberalization will benefit the poor on a national basis, but the northwestern area of Vietnam is likely to lag behind.

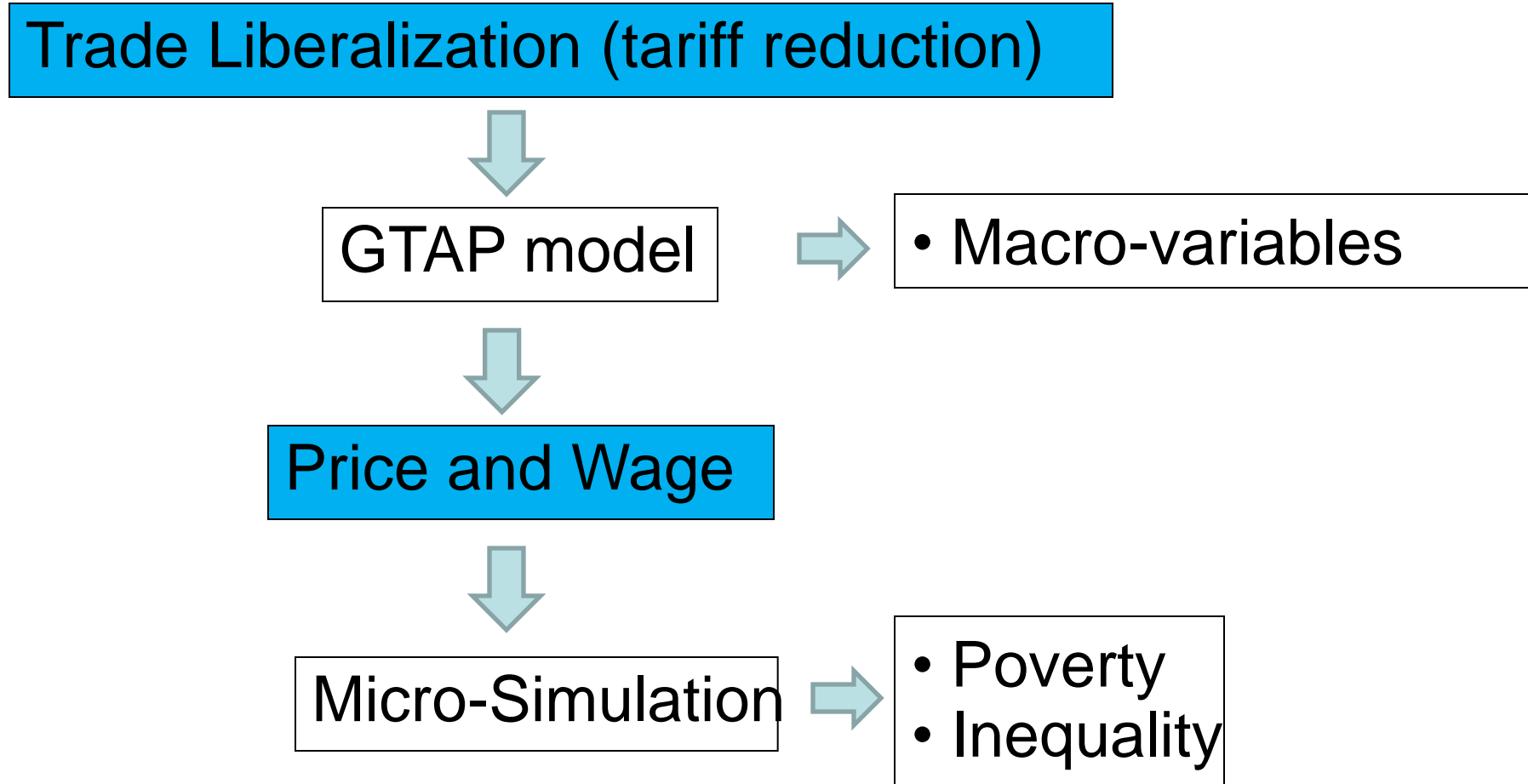
Literature Review

There are few studies using CGE model analysis for the Lao economy.

- Fukase and Martin (1999) built a simple CGE model to analyze the economic effect of joining AFTA.
- Warr (2006) built a two sector, multi-household CGE model to analyze the impact of a hydropower dam (NT2).
- Warr and Menon (2006) built a CGE model to assess the impact of road improvement on poverty.
- Warr, Menon and Yusuf. (2010) built Lao CGE to estimate the cross-border infrastructure on poverty.

Lack of studies on the impact of trade liberalization on and poverty using CGE model.

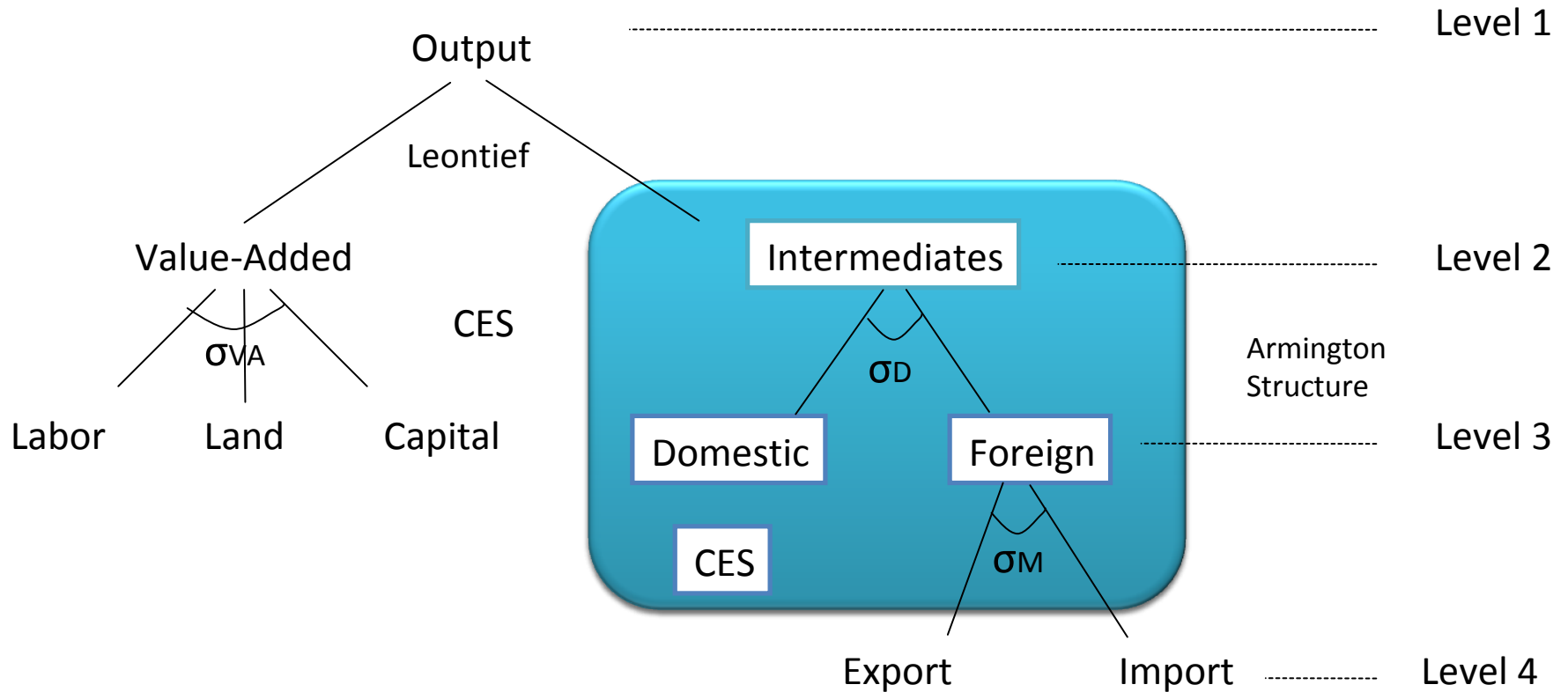
Methodological Framework



GTAP Model

- GTAP (Global Trade Analysis Project) model is multi-countries and multi sector Computable General Equilibrium (CGE) model.
- Trade specified via Armington assumption.
- Regional household collects all income and allocates across private consumption, government and savings.
- Explicit treatment of transportation costs in international trade via global transport sector.
- Global investments linked to global savings via a global bank.

Production structure (GTAP model)



Micro-Simulation

- The monetary value of the change in utility for household i (g_i) from Chen & Ravallion, 2004.
- Household welfare (g_i) is changed by four factors: revenue, expenditure, input, and wage.
- The four factors are changed by the change in consumer (p^d) and producer (p^s) prices and wage (w) by the GTAP model

$$g_i = \sum_{j=1}^{57} \left[p_{ij}^s q_{ij}^s \frac{dp_{ij}^s}{p_{ij}^s} - p_{ij}^d (q_{ij}^d + z_{ij}) \frac{dp_{ij}^d}{p_{ij}^d} \right] + \sum_{k=1}^2 \left(w_k L_{ik}^s \frac{dw_k}{w_k} \right)$$

= (change in revenue) - (change in expenditure) - (change in input) + (change in wage)

Data Sources and Research Scope

GTAP database (version 7): 2008 as base year

- 57 sectors
- 113 regions aggregated to 10 regions
- four factors product: land, capital, skill and un-skill labor
- Trade liberalization: in terms of tariff cut
- Focus on Laos

Data Sources and Research Scope

57 sectors

No	Code	Description	No	Code	Description
1	PDR	Paddy Rice	29	LEA	Leather products
2	WHT	Wheat	30	LUM	Wood products
3	GRO	Cereal grains nec	31	PPP	Paoer products, publishing
4	V_F	Vegetables,flyit,nut	32	P_C	Petroleum, coal products
5	OSD	Oil seeds	33	CRP	Chemical, rubber, plastic products
6	C_B	sugar cane, sugar beet	34	NMM	Mineral products nec
7	PFB	Plant-base fibers	35	I_S	Ferrous metals
8	OCR	Crops nec	36	NFM	Metals nec
9	CTL	Bovine cattle, Sheep and goats, houses	37	FMP	Metal product
10	OAP	Animal products nec	38	MVH	Motor vehicles and parts
11	RMK	Raw milk	39	OTN	Transport equipment nec
12	WOL	Wool, Silk-worm cocoons	40	ELE	Electronic equipment
13	FRS	Forestry	41	OME	Machinery and equipment nec
14	FSH	Fishing	42	OMF	Manufactures nec
15	COC	Coal	43	ELY	Electricity
16	OIL	Oil seeds	44	GDT	Gas manufacture, distribution
17	GAS	Gas	45	WTR	Water
18	OMN	Minerals nec	46	CNS	Construction
19	CMT	Bovine meat products	47	TRD	Trade
20	OMT	Meat products nec	48	OTP	Transport nec
21	VOL	Vegetables oils and fats	49	WTP	Water transport
22	MIL	Dairy products	50	ATP	Air Transport
23	PCR	Processed Rice	51	CMN	Communication
24	SGR	Sugar	52	OFI	Financial services nec
25	OFD	Food Products nec	53	ISR	Insurance
26	B_T	Beverages and tobacco products	54	OBS	Business sevices nec
27	TEX	Textiles	55	ROS	Recreational and other services
28	WAP	Wearing apparel	56	OSG	Public Addministration, Defense, Education, Health
			57	DWE	Dwellings

Data Sources and Research Scope

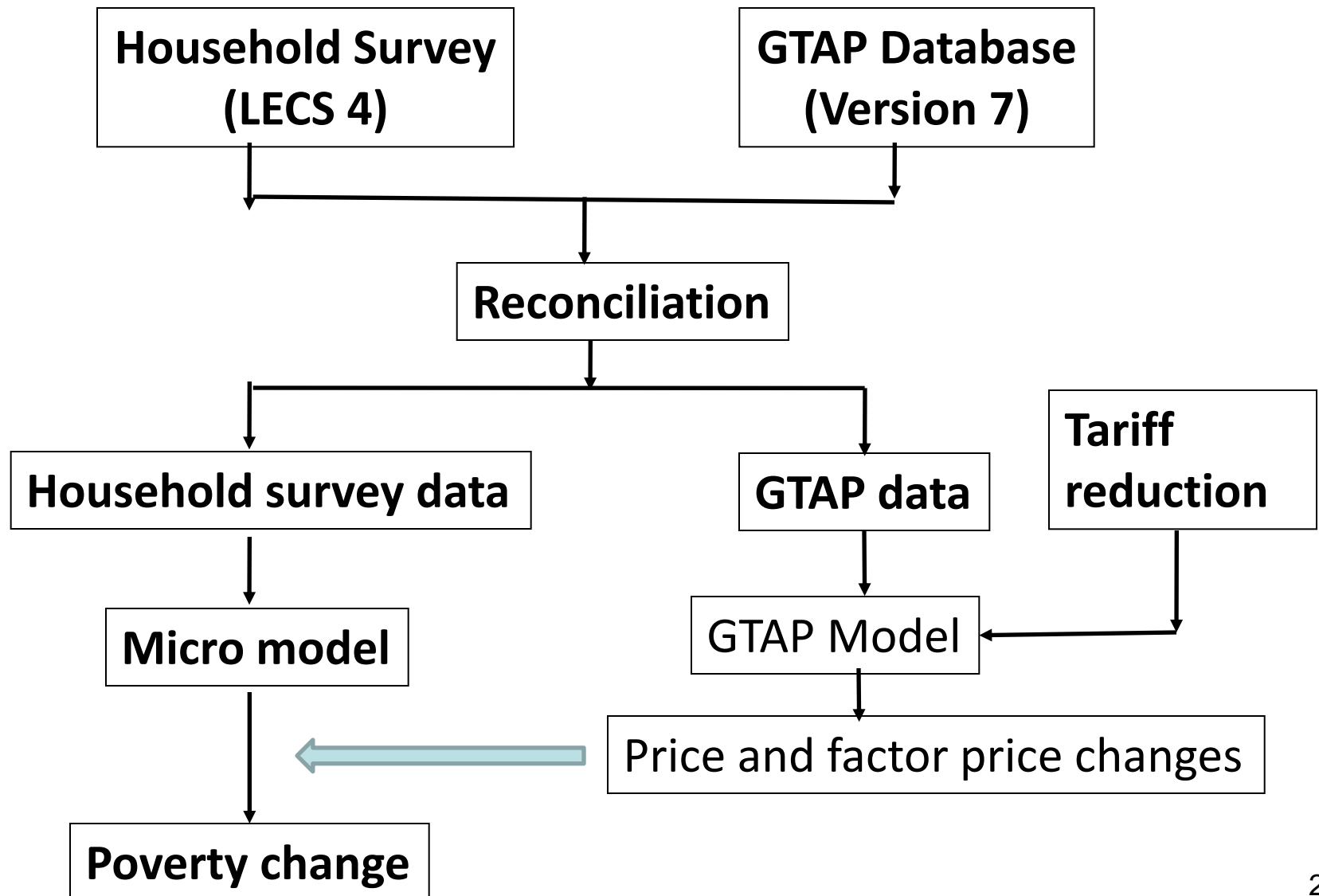
21 regions

No.	Country	No.	OTHERS
	ASEAN	14	European Union 25
1	Laos	15	Latin America
2	Cambodia	16	Middle East and North Africa
3	Indonesia	17	North America
4	Malaysia	18	Rest of Southeast Asia
5	Philippines	19	South Asia
6	Singapore	20	Sub-sahara Africa
7	Thailand	21	Rest of the world
8	Vietnam		
	ASEAN PLUS		
9	Australia, New Zealand		
10	China		
11	Japan		
12	Korea		
13	Rest of the East Asia		

Data Sources and Research Scope

- Fourth Lao Expenditure and Consumption Survey (LECS 4) in 2007/2008
 - 356 categories for consumption
 - 117 categories of production

Matching Household Survey Data to GTAP database



Simulation Design

- **AFTA has various benefits and costs.**

Simulation 1: Tariff cut

We assume that the Common Effective Preferential Tariff (CEPT) Scheme for AFTA will reduce to 0% in 2015.

Simulation 2: Improvement of trade facilitation

This approach is followed by Hertel, Walmsley, and Itakura (2001); Minor and Tsigas (2008) and Stone and Strutt (2009). We assume a reduction in costs of 25% in the Lao economy.

Simulation Design

Simulation 3: Increase FDI

Trade liberalization could promote Foreign Direct Investment (FDI) (Brown and Stern, 2001; NhuBinh and Haughton, 2002). We assume that the FDI inflow will increase by about 15%.

Simulation 4: Effect of AFTA

Simulation scenario 4 combines simulations 1 through 3 as an overall simulation of the impacts of AFTA on the Lao economy.

Simulation Results

Impact on macroeconomic variables

Variables	Unit	Simulation 1	Simulation 2	Simulation 3	Simulation 4
Equivalent variation	\$US dollar	13.61	219.42	189.51	422.53
GDP quantity index	%	0.12	3.1	6.79	9.5
Trade balance	\$US dollar	-32.41	-59.22	72.84	-18.79
Terms of trade	%	0.56	5.21	-2.34	3.43

Sources: authors' simulation from GTAP model.

Simulation Results

Impact on output (Top 10 sectors with increasing outputs)

No.	Code	Sector	Change (%)
1	mvh	Motor vehicles and parts	81.47
2	ome	Machinery and equipment	70.3
3	oil	Oil	56.63
4	nfm	Metals	48.91
5	crp	products	35.79
6	ely	Electricity	32.59
7	i_s	Ferrous metals	26.57
8	coa	Coal	21.01
9	wtr	Water	20.22
10	otn	Transport equipment	18.55

Simulation Results

Impact on output (Top 10 sectors with declining outputs)

No.	Code	Sector	Change (%)
1	sgr	Sugar	-55.6
2	lea	Leather products	-39.96
3	tex	Textiles	-33.41
4	ocr	Crops	-25.64
5	mil	Dairy products	-20.69
6	vol	Vegetable oils and fats	-19.21
7	wap	Wearing apparel	-15.61
8	isr	Insurance	-12.2
9	gas	Gas	-4.44
10	p_c	Petroleum, coal products	-4.07

Simulation Results

Impact on trade balance (Top 10 sectors increasing in trade balance)

No.	Code	Sector	Change(%)
1	nfm	Metals	250.340
2	oil	Oil	45.600
3	lum	Wood products	23.310
4	ely	Electricity	20.120
5	ros	services	7.020
6	gro	Cereal, grains	0.990
7	wht	Wheat	0.000
8	rmk	Raw milk	0.000
9	wol	cocoons	0.000
10	gas	Gas	0.000

Simulation Results

Impact on trade balance (Top 10 sectors declining in trade balance)

No.	Code	Sector	Change(%)
1	ofd	Food products	-39.42
2	ome	Machinery and equipment	-35.57
3	crp	Chemicals, rubber, plastic products	-29.17
4	p_c	Petroleum, coal products	-27.17
5	wap	Wearing apparel	-23.79
6	nmm	Mineral products	-20.06
7	otp	Transport	-19.5
8	ocr	Crops	-16.9
9	b_t	Beverages and tobacco products	-15.49
10	mvh	Motor vehicles and parts	-14.26

Welfare Impact

1. Mean welfare change			
	Baseline	Simulated	Change
	per capita (kip)	per capita (kip)	in percentage
National	-614,737	-541,908	11.85
Rural	-332,467	-265,662	20.09
Urban	-1,467,895	-1,376,859	6.20
Region			
Vientiane (capital)	-2,961,939	-2,867,558	3.19
North	-499,082	-460,666	7.70
Central	-912,230	-877,969	3.76
South	687,737	874,479	27.15
2. Gini index as percentage			
	Baseline	Simulated	Change (%)
National	45.26	44.88	-0.39
Rural	44.56	45.32	0.76
Urban	45.87	44.15	-1.72
Region			
Vientiane (capital)	48.03	44.17	-3.86
North	43.84	44.22	0.38
Central	42.88	45.08	2.20
South	42.37	46.35	3.99

Sources: Authors' computations based on the GTAP model and LECS 4.

Factors influence on absolute gains or losses of welfare (Gi)

Dependent variable : Gi	Coefficient	z-value	P> z
<i>Explanatory variables</i>			
<i>Factors of production</i>			
Irrigation Access to village	0.1448 *	1.80	0.0720
Number of Cattle per household	0.0226 ***	4.18	0.0000
Number of Buffalo per household	0.0619 ***	6.44	0.0000
Number of Pigs per household	0.0278 ***	4.00	0.0000
Total number of Literate per household	0.0476 **	2.21	0.0270
Literate Females	0.0451	1.53	0.1270
Education level of household head in years	0.0626 ***	9.10	0.0000
Adults	0.0332	1.54	0.1230
Rice farm land Area per household	-0.0121	-0.71	0.4750
Other Cultivation Land Area per household	0.0824 ***	4.24	0.0000
Village located at Lowland Area	0.3063 ***	5.61	0.0000
Chemical fertilizers	0.2088 **	2.63	0.0090
Business	-0.1798 ***	-3.08	0.0020
<i>Household characteristics</i>			
Dependency Ratio	-0.1270	-1.24	0.2140
Male Head of Household	0.0722	0.69	0.4880
Age of Household Head	-0.0053	-0.44	0.6610
Age Squares of Household Head	0.0001	0.58	0.5650
<i>Environmental factors</i>			
Access to All Season Road	0.0543	0.87	0.3870
Electricity Access	-0.0639	-1.05	0.2920
Access to Safe Water	-0.0048	-0.09	0.9240
Community Health	0.2097 ***	4.38	0.0000
Distance from Village to Hospital	0.0005	0.36	0.7200
Access to Market	0.1833 **	2.07	0.0380
<i>Constant</i>	-1.4223 ***	-4.63	0.0000
Number of observations	8293		
LR chi2(8)	433		
Prob> chi2	0.0000		
Pseudo R2	0.0383		

Conclusion and recommendation

- Direct impact of tariff cuts will be minimal.
- However, the indirect effects from AFTA, such as the improvement of trade facilitation and promotion of FDI, are expected to be much larger.
- AFTA will increase real GDP and welfare in Laos.
- However, it will also increase its trade deficit and create winners and losers in production outputs.

Conclusion and recommendation

- The impacts of AFTA on welfare are positive on the national level, for urban households, and for rural households on the whole.
- AFTA will also reduce inequality at the national level but impacts of AFTA on inequality are predicted to be heterogeneous across the region.

Conclusion and recommendation

- The beneficiaries of AFTA are determined by whether households have access to irrigation; the number of livestock including cattle, buffalo, and pigs; the number of literate members of the household; the education of household head; the land area of the household; and access to community and market.

Thank You Very Much for Your Attention!