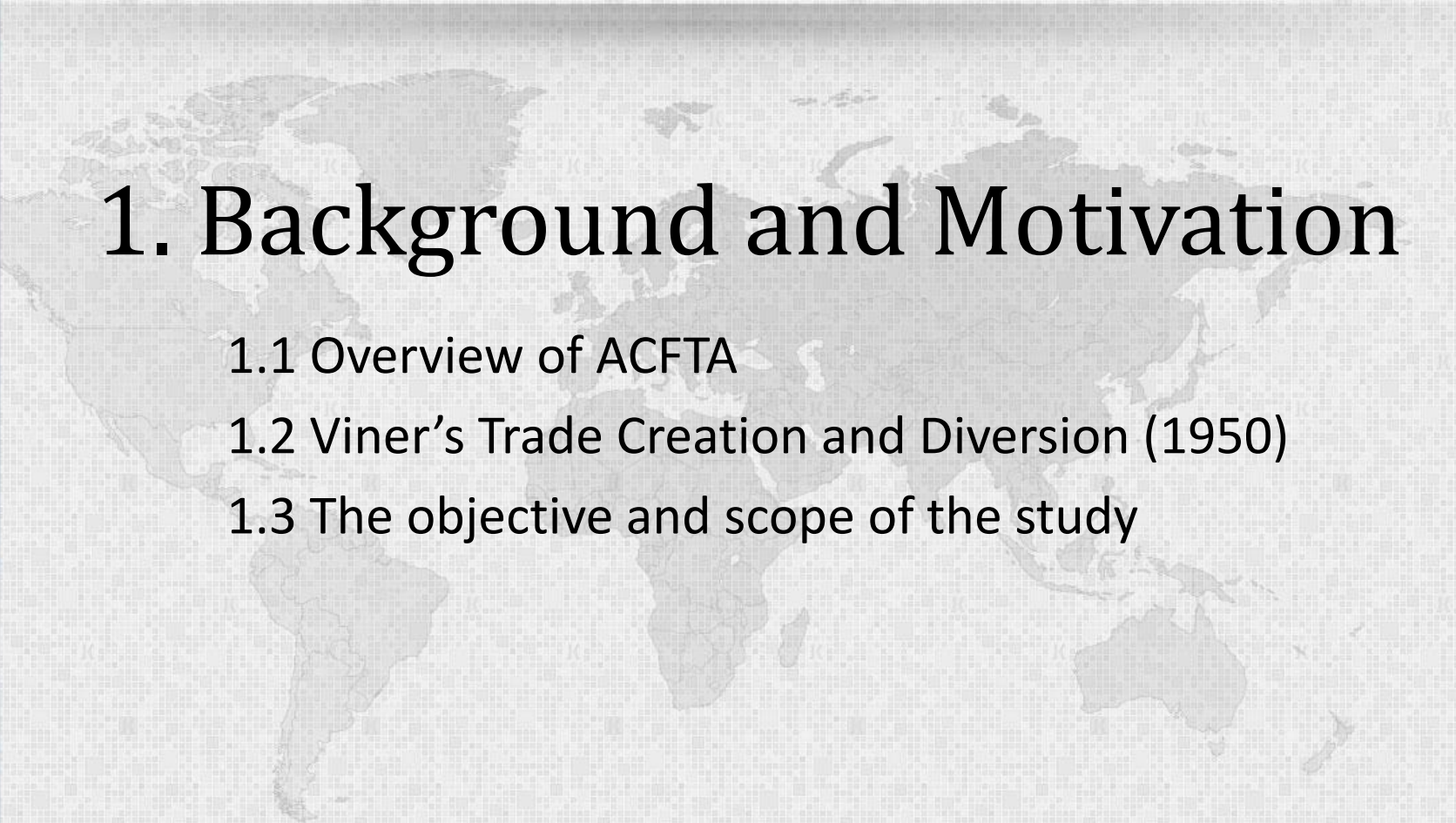


A Gravity Model for Trade Creation and Diversion of the ACFTA

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Theory and Policy

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1. Background and Motivation

1.1 Overview of ACFTA

1.2 Viner's Trade Creation and Diversion (1950)

1.3 The objective and scope of the study

Overview of ACFTA

Mid 1990s

- China has more important role in the world trade.
- Trade between ASEAN and China increase substantially.

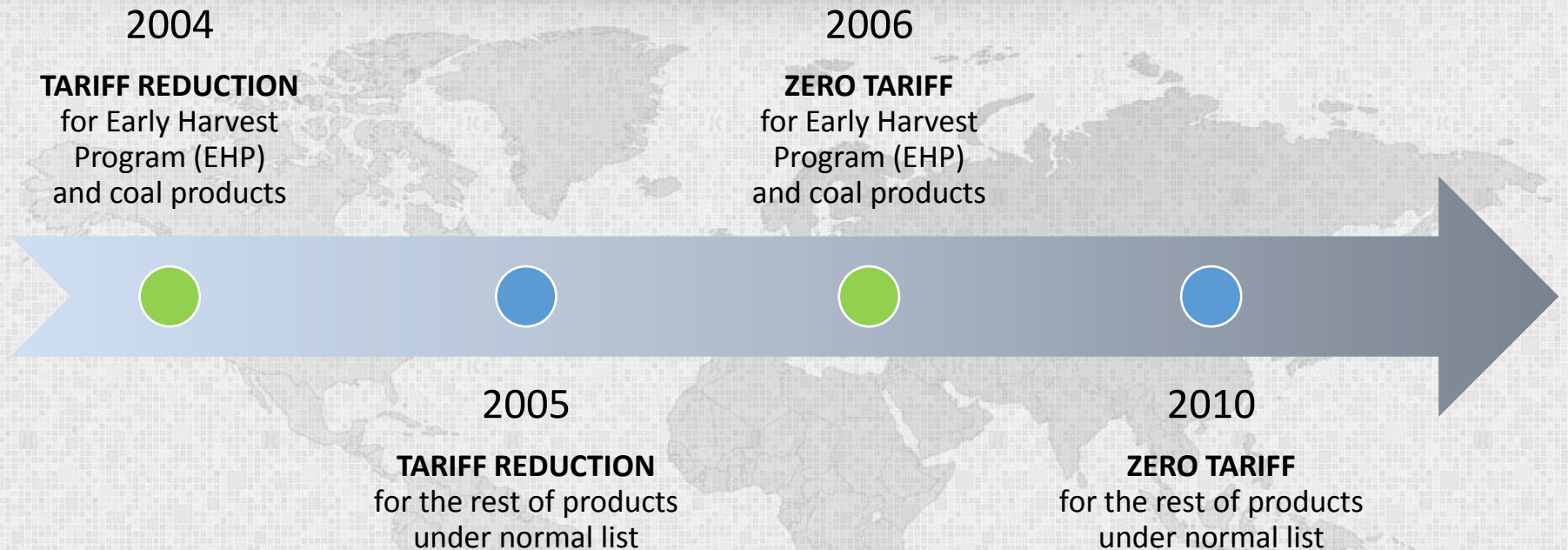
2001

- The initial framework agreement of ACFTA was signed including the agreement on trade in goods, services, investment and dispute settlement mechanism.

2010

- All agreement of ACFTA come into effect.
- This FTA is considered as the largest free trade area in terms of population and the 3rd largest in terms of nominal GDP.

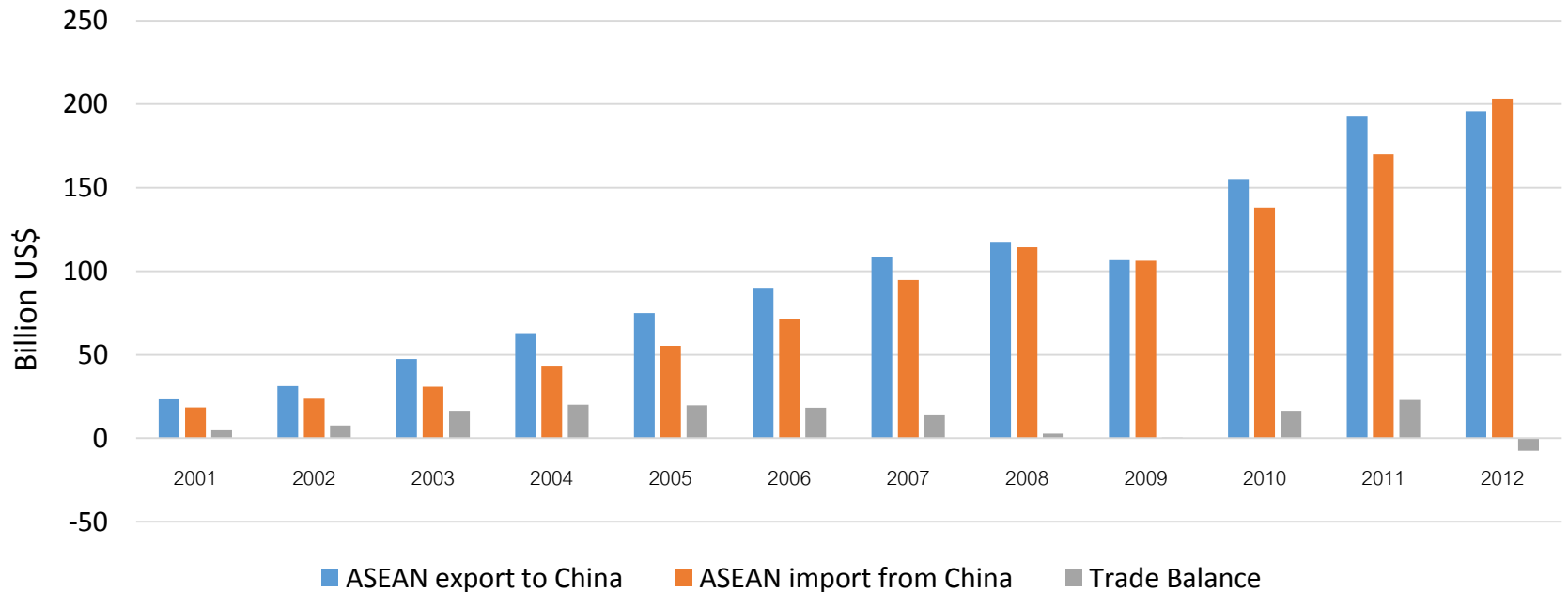
The agreement on trade of ACFTA



Remark

- This time line is for ASEAN6 only. CLMV's zero tariff period is 4-5 years longer than ASEAN6.
- Early Harvest Program (EHP) covers HS code 01-08 e.g. agricultural goods, meat, fish, fruit and vegetables, etc.
- For sensitive and highly sensitive products (depending on each county), there is still tariff imposed.
 - not exceed 5% after 2018 for sensitive goods
 - not exceed 50% after 2015 for highly sensitive goods.

Bilateral trade between ASEAN and China

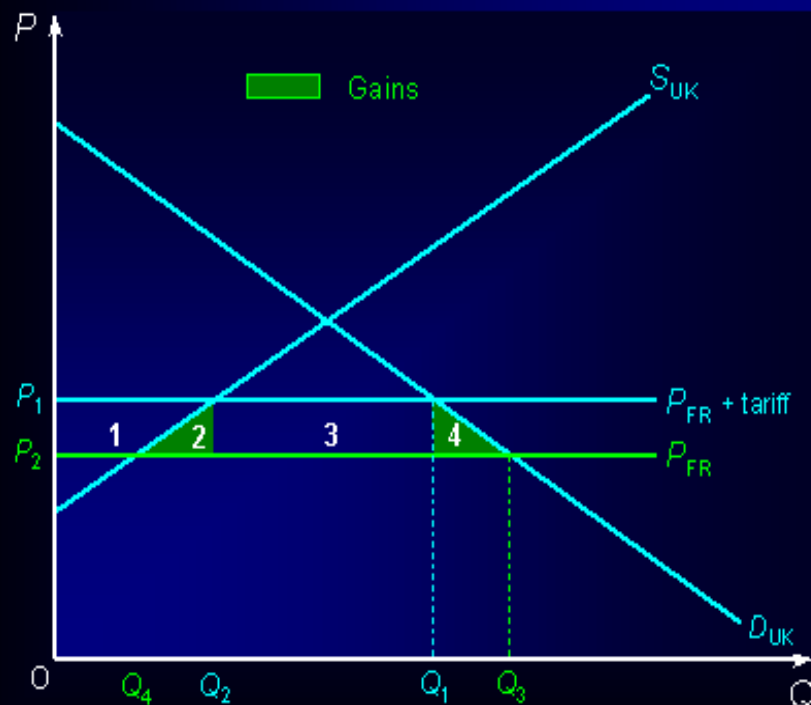


Observation

- ASEAN became the 3rd largest trading partner of China after USA and EU28.
- For ASEAN, China is the 1st largest trading partner.
- Bilateral trade between ASEAN and China increased more than four-fold from 2004 to 2012 as a result from a reduction in import duties between them.

Viner's Trade Creation and Diversion (1950)

Trade creation

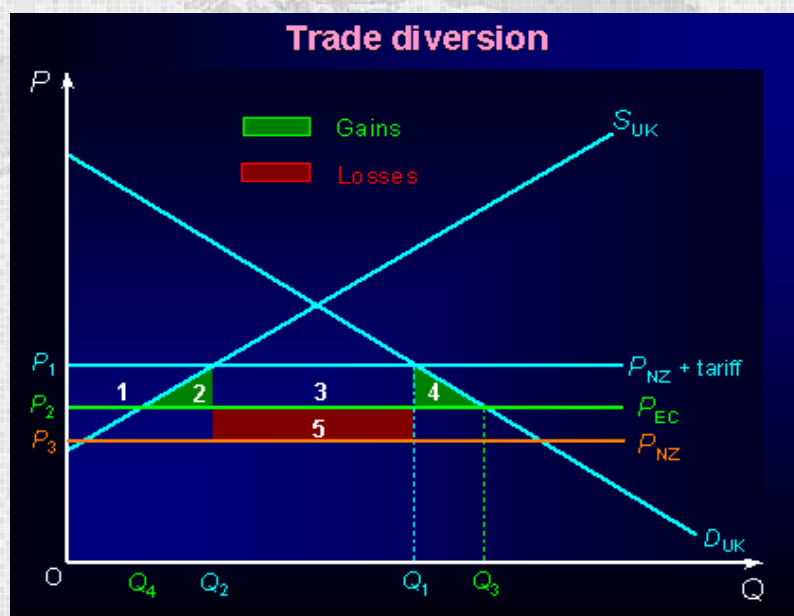


Trade Creation is welfare-increasing effect occurring when it is more efficient to import good from a partner in FTA than to produce it domestically.

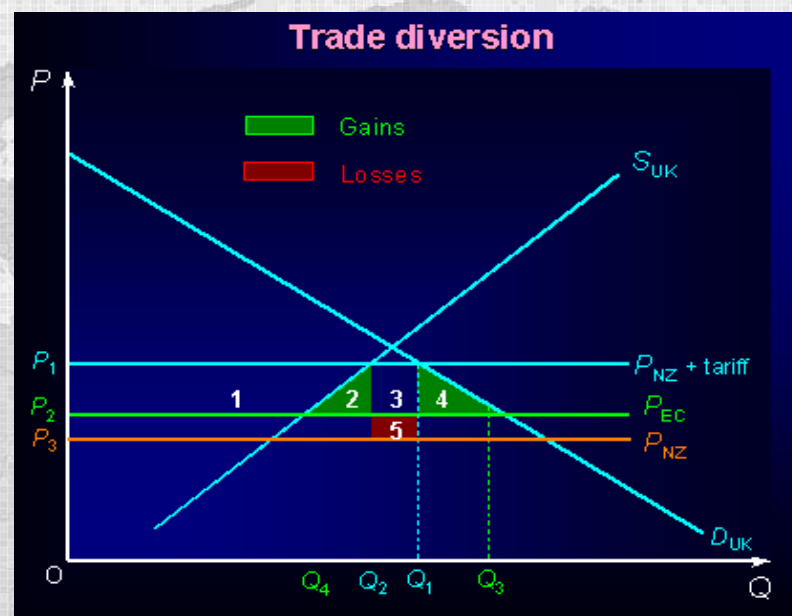
	Welfare Change
Consumer Surplus	$1 + 2 + 3 + 4$
Producer Surplus	$- 1$
Government Tax	$- 3$
NET Welfare	$2 + 4$
Note: Welfare improve since $2 + 4 > 0$	

Viner's Trade Creation and Diversion (1950)

Trade Diversion is welfare-reducing effect occurring when imports from efficient sources are shifted to inefficient sources that are benefitting from tariff preferences associated with membership to FTA.



	Welfare Change
Consumer Surplus	1 + 2 + 3 + 4
Producer Surplus	- 1
Government Tax	- 3
NET Welfare	2 + 4
Note: Welfare improve since where $2 + 4 > 5$	



	Welfare Change
Consumer Surplus	1 + 2 + 3 + 4
Producer Surplus	- 1
Government Tax	- 3 - 5
NET Welfare	2 + 4 - 5
Note: Welfare worst off since where $2 + 4 < 5$	

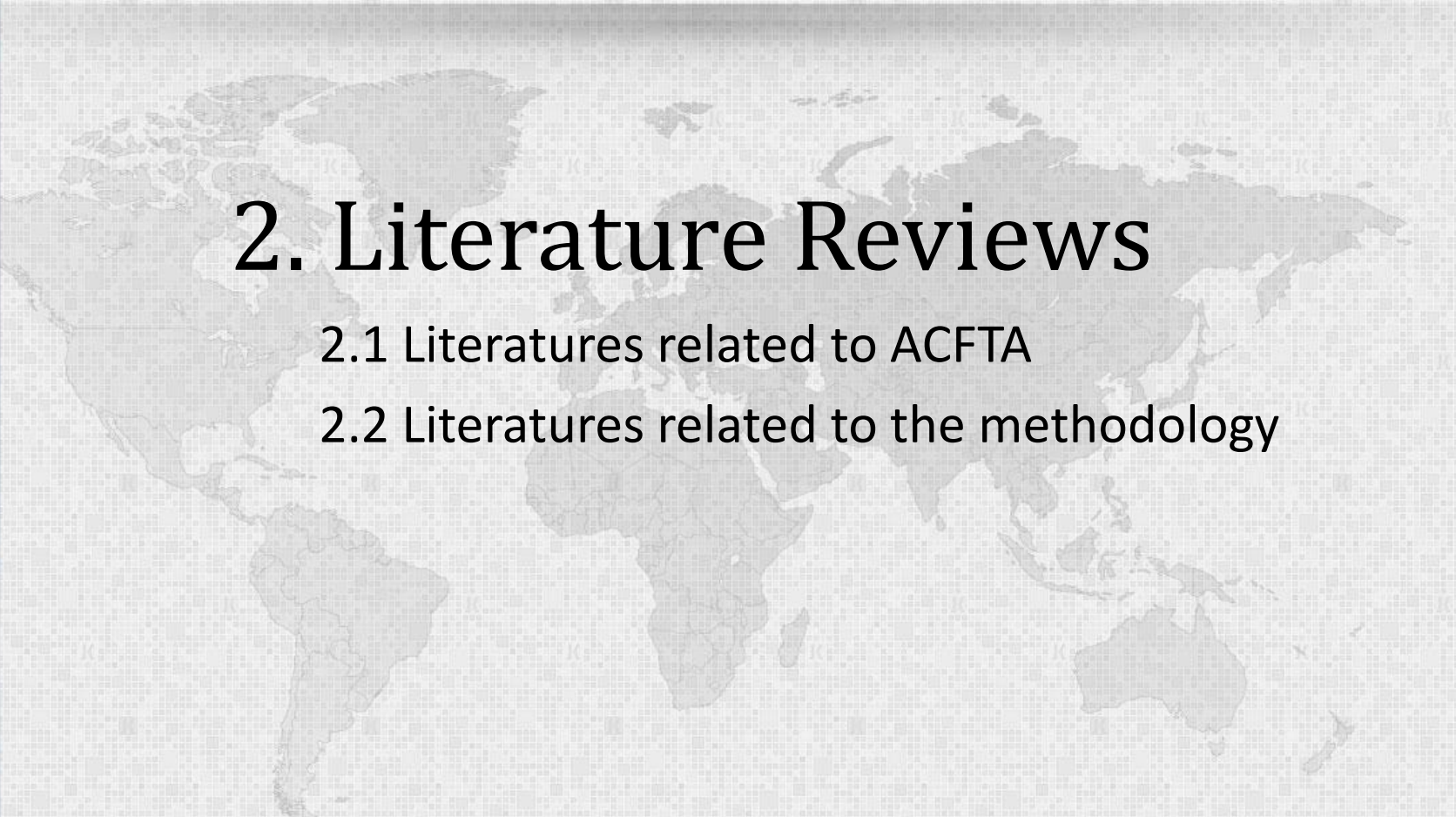
The objective and scope of the study

Objective of the study

- To examine welfare changes caused by Trade Creation and diversion after ACFTA came into effect.
- To find which factors influence the trade flow in ACFTA.
- To give the proper policy recommendations based on empirical results.

Scope of the study

- The chosen year 2010 (when ACFTA came in to full effect) is more updated than the paper works before.
- Data set covered 19 countries: 9 ACFTA members and 10 non-ACFTA members whose are the main trading partner of ASEAN and China.



2. Literature Reviews

2.1 Literatures related to ACFTA

2.2 Literatures related to the methodology

2.1 Literatures related to ACFTA

They divided into 2 groups according to the analysis method.

1. The general equilibrium analysis

- computational General Equilibrium Model (CGE)
- Global Trade Analysis Project (GTAP)

2. The partial equilibrium analysis

- Market Share model
- Price-discrimination model
- Balassa Ex-ante & Ex-post and Import demand function
- The Gravity Model for trade

The results of literatures related to ACFTA are mixed

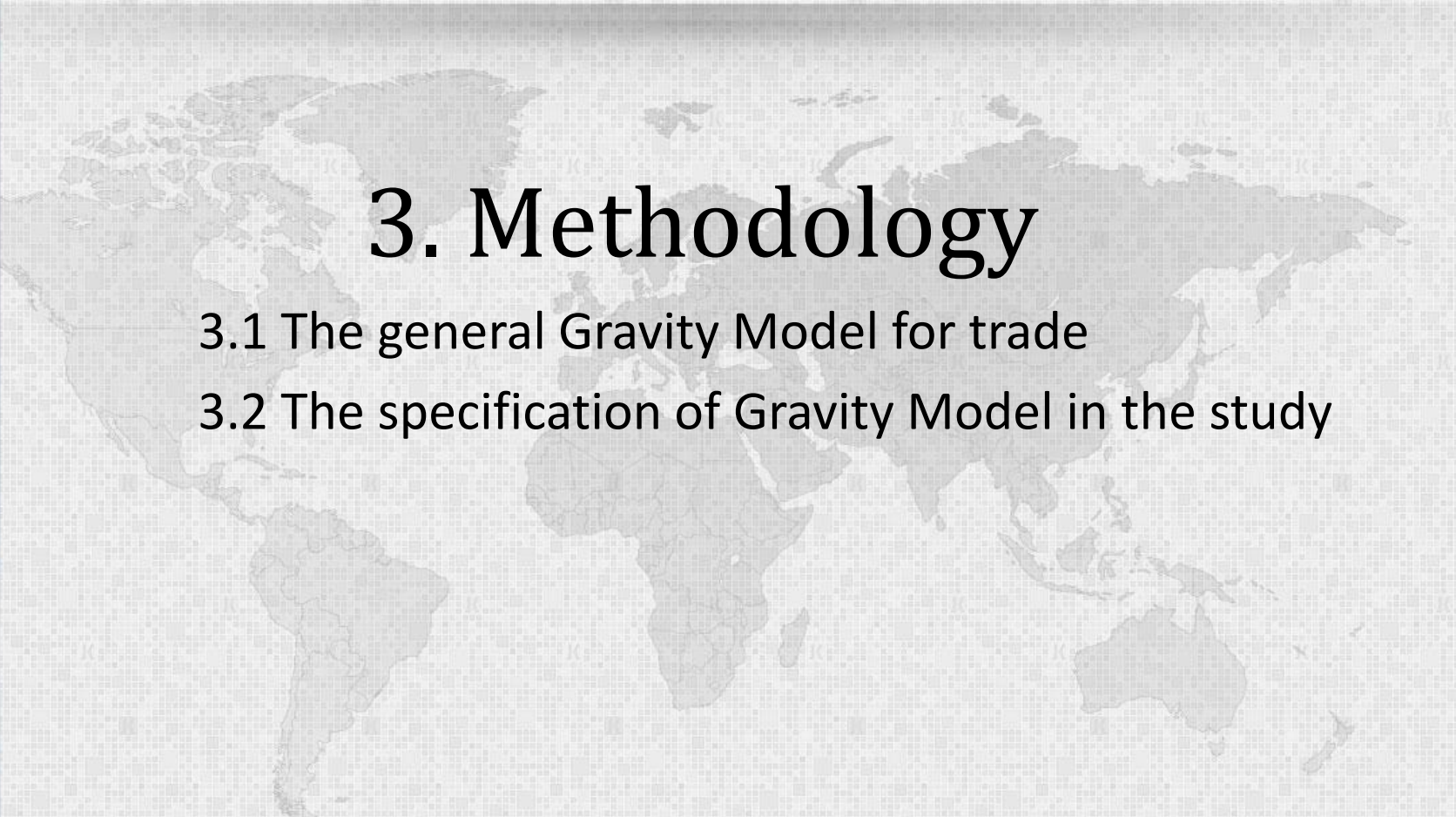
General Equilibrium Analysis		
Author	Result	Description
Chirathivat (2002) CGE	+	- GDP of ASEAN and China increased after ACFTA. - China's imports of rice, sugar and vegetable oil and will increase China's export of fruits.
Yang and Chen (2006) GTAP	+ / -	- Trade Creation so welfare of ACFTA members improved (esp. transition period of 2004-2006) - Trade Diversion because the member countries traded less with non-members countries.
Qiu, Yang, Huang and Chen (2007) GTAP	+	- ACFTA supported agricultural trades between ASEAN and China lead to more efficient resource allocation - The economy of both parties expanded.
Park et al.. (2008) GTAP	+	- Positive effects include Trade Creation, higher output as well as better welfare for the region. - CLMV would benefit more from ACFTA then more advanced counties such as Singapore and Malaysia.

Partial Equilibrium Analysis		
Author	Result	Description
Zhang and Hock (1996)	+ / -	- Negative spillover to ASEAN's FDI caused by rapid expansion of China - ASEAN and China would get a benefit in long run by economic integration between them.
Ahearne et la. (2004)	+ / -	- In aggregate level, the complementary exporting linkage between ASEAN and China existed. - By reducing tariffs from ACFTA would increase trading competitiveness member countries.
Roland-Holst and Weiss (2004)	+ / -	- ASEAN significant loss market share in USA and Japan due to a rise in the competition with China. - The future growth of China could help ASEAN to hold their market shares in East Asia mainly for higher value-added products.
Roberts (2004)	Insignifi- cant	If Linder effect existed, it indicates the trade enchantment in ACFTA but the statistical coefficient of related variable is insignificant.

2.2 Literatures related to the methodology

The gravity model in the literatures can be separated into 2 methods.

1. **Based on Ballassa concept** (income elasticity of import demand)
 - If the elasticity is positive, there would be a Trade Creation.
 - If the elasticity is negative, there would be a Trade Diversion.
2. **The general gravity model** (Regional dummies used to capture the Trade Creation and Diversion of FTA)
 - **1 dummy variable:** Atiken (1973), Bayomi (1997).
 - **2 dummy variables:** Hinbun (2006), E.M. Ekanayake et al. (2010).
 - **3 dummy variables:** Yang and Martines-Zarzoso (2013).



3. Methodology

3.1 The general Gravity Model for trade

3.2 The specification of Gravity Model in the study

The Gravity Model

- The classical and new trade theory cannot be applied to quantify the magnitude of trade empirically **while gravity model can**.
- The Gravity Model for trade has been used to find determinants of trade and find the Trade Creation and Diversion effects of FTA.

Newton's universal law of gravitation (1687)

$$F = G \left(\frac{m_1 m_2}{r^2} \right)$$

- F is the force between the masses.
- m_1 and m_2 is the first and the second mass.
- r is the distance between the centers of the masses.
- G is the gravitational constant.

Tinbergen's Basic Gravity Model for trade (1962)

$$F_{ij} = G \left(\frac{M_i^{\beta_1} M_j^{\beta_j}}{D_{ij}^{\beta_3}} \right) \eta_{ij}$$

- F_{ij} represents volume of trade from country i to country j .
- M_i and M_j generally represent the GDPs for countries i and j .
- D_{ij} represents the distance between the two countries.
- η_{ij} represents an error term with expectation equal to 1.
- G is a constant.

The Gravity Model

Most analytical work also included other factors besides distance and the size of economy or GDP.

- exchange rate
- population
- income per capita
- economic policy (tariffs, exchange rate regime)
- historical background (colonial ties)
- common language
- geographic factor (landlocked, share same borders, remoteness)

The econometric estimation of the gravity model can be done in 2 ways.

1. Log-log model by taking the natural log of both sides
→ Linear Regression such as OLS.

$$\ln(F_{ij}) = \beta_0 + \beta_1 \ln(M_i) + \beta_2 \ln(M_j) - \beta_3 \ln(D_{ij}) + \epsilon_{ij}$$

2. The multiplicative form by using original model
→ Poisson pseudo-maximum likelihood (PPML)

$$F_{ij} = \exp[\beta_0 + \beta_1 \ln(M_i) + \beta_2 \ln(M_j) - \beta_3 \ln(D_{ij})] \eta_{ij}$$

The specification of Gravity Model in this study

- **3 dummy variables** are added in the basic model of gravity for trade to capture the outcomes of Trade Creation, Export Diversion and Import Diversion which are extend from Vinerian integration effects (1950).
- **The population** are additionally included in the equation 2.
- The model of this paper are consistence with Endoh (1999), Soloaga and Winters (2001), Carrère (2006), Magee (2008) and Martínez-Zarzoso et al. (2009).

$$\ln X_{ij} = \beta_0 + \beta_1 \ln Y_i + \beta_2 \ln Y_j + \beta_3 \ln D_{ij} + \alpha_1 ACFTA_{ij} + \alpha_2 exACFTA_{ij} + \alpha_3 imACFTA_{ij} + \varepsilon_{ij} \quad (1)$$

$$\ln X_{ij} = \beta_0 + \beta_1 \ln Y_i + \beta_2 \ln Y_j + \beta_3 \ln D_{ij} + \beta_4 \ln N_i + \beta_5 \ln N_j + \alpha_1 ACFTA_{ij} + \alpha_2 exACFTA_{ij} + \alpha_3 imACFTA_{ij} + \varepsilon_{ij} \quad (2)$$

Note: $\ln X_{ij}$ denotes the value of bilateral exports from exporter country i to importer country j in current US\$

Interpretation and Expected Results

$$\ln X_{ij} = \beta_0 + \beta_1 \ln Y_i + \beta_2 \ln Y_j + \beta_3 \ln D_{ij} + \beta_4 \ln N_i + \beta_5 \ln N_j + \alpha_1 ACFTA_{ij} + \alpha_2 exACFTA_{ij} + \alpha_3 imACFTA_{ij} + \varepsilon_{ij}$$

Variable		Description	Parameter	Expected sign
Core factors	$\ln Y_i$ Economic Size	Value of GDP of exporter country i in current US\$	β_1	+
	$\ln Y_j$ Economic Size	Value of GDP of importer country j in current US\$	β_2	+
	$\ln D_{ij}$ Proxy of cost of transportation	Distance between capital cities i.e. economic center of the exporter country i and importer country j in kilometers	β_3	-
Additional Factors	$\ln N_i$ Factor endowment and market size	Population of exporter country i	β_4	+ / -
	$\ln N_j$ Factor endowment and market size	Population importer country j	β_5	+ / -

Interpretation and Expected Results

$$\ln X_{ij} = \beta_0 + \beta_1 \ln Y_i + \beta_2 \ln Y_j + \beta_3 \ln D_{ij} + \beta_4 \ln N_i + \beta_5 \ln N_j \\ + \alpha_1 ACFTA_{ij} + \alpha_2 exACFTA_{ij} + \alpha_3 imACFTA_{ij} + \varepsilon_{ij}$$

Variable		Description	Parameter	Expected sign
ACFTA integration effects	$ACFTA_{ij}$ Trade Creation	= 1 when both exporter country i and importer country j are members the ACFTA = 0 otherwise	α_1	+
	$exACFTA_{ij}$ Export Diversion	= 1 when only exporter country i is a member of ACFTA but exporter country j is not a member = 0 otherwise	α_2	+ / -
	$imACFTA_{ij}$ Import Diversion	= 1 when only importer country j is a member of ACFTA but exporter country i is not a member = 0 otherwise	α_3	+ / -

Interpretation and Expected Results

According to Martínez-Zarzoso et al. (2009), the sign of α_1 alone is not sufficient to determine whether there is a **Net Trade Creation** in FTA, α_2 and α_3 must be considered as well.

$$\ln X_{ij} = \beta_0 + \beta_1 \ln Y_i + \beta_2 \ln Y_j + \beta_3 \ln D_{ij} + \beta_4 \ln N_i + \beta_5 \ln N_j \\ + \alpha_1 ACFTA_{ij} + \alpha_2 exACFTA_{ij} + \alpha_3 imACFTA_{ij} + \varepsilon_{ij}$$

	Export Effects		Import Effects	
	$\alpha_2 > 0$	$\alpha_2 < 0$	$\alpha_3 > 0$	$\alpha_3 < 0$
$\alpha_1 > 0$	Pure Trade Creation in term of export	- Trade Creation and Export Diversion $\alpha_1 > \alpha_2$ - Export Diversion $\alpha_1 < \alpha_2$	Pure Trade Creation in term of import	- Trade Creation and Import Diversion $\alpha_1 > \alpha_3$ - Import Diversion $\alpha_1 < \alpha_3$
$\alpha_1 < 0$	Expansion of extra-bloc exports	Export Diversion and Contraction of intra-bloc exports	Expansion of extra-bloc imports	Import Diversion and Contraction of intra-bloc imports



4. Empirical Results

4.1 Data description and sources

4.2 Interpretation and Expected Results

Data description and sources

The cross-section data of 2010 is selected.

- ACFTA came into effect on 1 January 2010 .
- Data of 2010 is very complete.
- Hufbauer, Schott and Elliott (2007): the gravity model is more suitable with cross-sectional data.

The nominal term are used to run regression.

- UNESCAP (2013): For cross-sectional data, whether the data are expressed in the nominal or real terms will give equivalent results regardless of any uniform scaling.
- Linneman (1966): There will be small difference in the coefficients of determination if real GDP are used to replace nominal GDP.

Data description and sources

The model is tested on samples of 19 countries. In total, there are 343 observations.

- The 9 countries are from the members of ACFTA: Cambodia, China, Indonesia, Laos, Malaysia, Philippines, Singapore, Thailand and Vietnam except Brunei and Myanmar due to lack of data.
- The rest 10 countries are from non-ACFTA member which are major trading partners of ACFTA: Australia, France, Germany, Hong Kong, India, Japan, Russian, South Korea, United Kingdom and United States of America.

Data	Data Sources
Bilateral Export at current US\$ (2010)	Trade Map of International Trade Center (2013)
GDP at current US\$ (2010)	World Development Indicator of World Bank (2013)
Population (2010)	World Development Indicator of World Bank (2013)
Distance	Time and Date distance calculator

Empirical Results

Independent Variables	Equation 1	Equation 2
Constant	-24.7299*** (-11.3347)	-26.7347*** (-13.4529)
$\ln Y_i$ Economic Size	1.0951*** (20.3748)	1.4688*** (20.6653)
$\ln Y_j$ Economic Size	0.9602*** (17.8409)	1.2431*** (17.4754)
$\ln D_{ij}$ Proxy of cost of transportation	-1.1968*** (-10.2954)	-0.5053*** (-7.1681)
$\ln N_i$ Factor endowment and market size		-0.3806*** (-5.3990)
$\ln N_j$ Factor endowment and market size		-1.2461*** (-11.8326)
$ACFTA_{ij}$ Trade Creation	0.9555*** (3.0843)	2.0672*** (6.7041)
$exACFTA_{ij}$ Export Diversion	0.9241*** (3.6174)	1.5914*** (6.3942)
$imACFTA_{ij}$ Import Diversion	0.5155** (2.0174)	1.0216*** (4.1032)
P-value of F-test	0.0000	0.0000
Adjusted R ²	0.7030	0.7570
SEE	1.4663	1.3264

The equation 2 should be more accurate since its adjusted R² is higher and standard error of the equation is lower.

Thus, the equation 2 is chosen as the main equation for this paper.

Note: 1. *** and ** denotes the coefficient is significant at 1% and 5% level respectively.

2. T-value is in parentheses

Empirical Results

$$\ln X_{ij} = -26.73 + 1.47 \ln Y_i + 1.24 \ln Y_j - 0.5 \ln D_{ij} - 0.38 \ln N_i - 1.25 \ln N_j \\ + 2.07 ACFTA_{ij} + 1.59 exACFTA_{ij} + 1.02 imACFTA_{ij}$$

Core and additional variables

- The GDP and distance are consistent with expectation.
- The populations: The larger population means the larger absorption effect which causes less dependency on international specialization so international trade reduced.

ACFTA integration effects

- The coefficient of $ACFTA_{ij}$: There is intra-regional Trade Creation effect after ACFTA has fully in effect. Hence, the welfare of member countries increase.
- The coefficient of $exACFTA_{ij}$: ACFTA members export to non-members more beyond the hypothetical trade level (export expansion). Thus, the welfare also increases for the non-members countries.
- The coefficient of $imACFTA_{ij}$: ACFTA members import more from non-ACFTA members (import expansion).

Empirical Results

$$\ln X_{ij} = -26.73 + 1.47 \ln Y_i + 1.24 \ln Y_j - 0.5 \ln D_{ij} - 0.38 \ln N_i - 1.25 \ln N_j \\ + 2.07 ACFTA_{ij} + 1.59 exACFTA_{ij} + 1.02 imACFTA_{ij}$$

- For export effect, $\alpha_1 > 0$ and $\alpha_2 > 0$ there is **Pure Trade Creation on export**.
- For import effect, $\alpha_1 > 0$ and $\alpha_3 > 0$ there is **Pure Trade Creation on import**.
- By reducing and removing tariff rates in ACFTA enhance trade volume not only intra-bloc but also extra-bloc. Thus, The welfare for member and non-member raises.

	Export Effects		Import Effects	
	$\alpha_2 > 0$	$\alpha_2 < 0$	$\alpha_3 > 0$	$\alpha_3 < 0$
$\alpha_1 > 0$	Pure Trade Creation in term of export	• Trade Creation and Export Diversion $\alpha_1 > \alpha_2$ • Export Diversion $\alpha_1 < \alpha_2$	Pure Trade Creation in term of import	• Trade Creation and Import Diversion $\alpha_1 > \alpha_3$ • Import Diversion $\alpha_1 < \alpha_3$
$\alpha_1 < 0$	Expansion of extra-bloc exports	Export Diversion and Contraction of intra-bloc exports	Expansion of extra-bloc imports	Import Diversion and Contraction of intra-bloc imports

The factors causing the Pure Trade Creation

- Reduction of tariff rates in ACFTA.
- The location of ACFTA members is near so transportation costs are low.
- The more different in development stages in region, the more Trade Creation and less Trade Diversion.
- Ponpiruth (2009): The economic integration with large economies benefits the member counties more than the integration with many small economies.
- Suranovic (2008): The size of Trade Diversion depends on the different in trade barriers between intra-bloc and extra-bloc.

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5. Conclusion and Policy recommendations

5.1 Conclusion

5.2 Policy recommendations on empirical finding

5.3 For Further studies

Conclusion

The determinants of export (Ranking from high to low)

- The factors that positively affect exports are GDPs of exporter, GDPs of importer.
- The factors that negatively affect exports are population of importer, distance, population of exporter.

Regional Integration effects

- The regional dummies are all positive and statistically significant. The meaning is that ACFTA enhance the trade volume among intra-bloc and extra-bloc.
- Since the coefficient of Trade Creation is higher than coefficient of export and Import Diversion, there is **Pure Trade Creation of export and import** thus welfare of intra-bloc and extra-bloc improved.

Recommendations from the empirical finding

ACFTA Policy

- The trade policy of ACFTA should be remain because it also improves the trade growth and welfare of ACFTA members and non-ACFTA members.
- Not only tariff that should reduce but ACFTA-members should pay more attention to product differentiation, structure of trade complementary, cooperation on vertical integration and efficiency in custom procedures.

The negotiation on other FTA

- A government should negotiate with countries of higher development to gain the Trade Creation since their incomes are high.
- The distance also play great role in determining comparative advantage. A country should focus on improving logistic and expanding market around the region (not just large economies).
- A government should target more on country that has smaller absorption effect.

For Further studies

- More countries as the rest of the world should be included to test a model.
- The panel data should be used to see the change of variables over time.
 - The empirical result from method of pooled OLS, fixed effect and random effect should be compare to determine the best one as the main model.
- All econometric problems such as auto-correlation, heteroscedasticity and endoginity should be solve to obtain more accurate results.
- Disaggregate data should be used to analyze the effect of ACFTA on each export products.

A faint, light gray world map is centered in the background of the slide. The map shows the outlines of the continents, with North and South America on the left, Europe and Africa in the center, and Asia and Australia on the right. The map is semi-transparent, allowing the text to be clearly visible over it.

Thank you
for your attention