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### How Does Foreign Direct Investment (FDI) Affect Environmental Pollution

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Khoo, Ming Wie and Davidsson, Michael, "How Does Foreign Direct Investment (FDI) Affect Environmental Pollution" (2018). *Paper Presentations*. 13.

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# RESEARCH COLLOQUIUM 2018

PITTSBURG STATE  
UNIVERSITY

Ming Wie Khoo

# INTRODUCTION

How does foreign direct investment (FDI) affect environmental pollution?



# PURPOSE AND CONTRIBUTION OF THE STUDY

- ▶ To study the effect of FDI toward Environmental Pollution
- ▶ Dependent Variable (DV):
  1. Net foreign direct investment (FDI).
- ▶ Independent Variable (IV):
  1. Carbon dioxide (CO<sub>2</sub>) emissions from liquid fuel consumption.
  2. CO<sub>2</sub> emissions from burning of fossil fuel and manufacture of cement.
  3. Rate of primary completion(% of relevant age group).

# THE EMPIRICAL MODEL

## Using the Ordinary Least Square (OLS) Method: Panel Regression

$$\left[ \begin{array}{c} \text{Net foreign direct investment (FDI).} \\ 1960 - 2017 \end{array} \right] =$$

[Carbon dioxide (CO<sub>2</sub>) emissions from liquid fuel consumption.]

+

[Carbon dioxide (CO<sub>2</sub>) emissions from burning of fossil fuel and manufacture of cement]

+

[Rate of primary completion(% of relevant age group).]

# DATA



- United Nations Conference on Trade and Development (UNCTAD).



- Klynveld Peat Marwick Goerdeler (KPMG) International.



- World Bank.



- Bloomberg New Energy Finance.

# LITERATURE REVIEW



## ► Natalia Zugravu Soilita, 2005

1. **Pollution Haven Hypothesis:** Weak environmental regulations in a host [developing] country attracts foreign firms to avoid high environmental cost compliance of guest [developed] country of origin.
2. **Endowments Factor Hypothesis:** Contradicts previous hypothesis → Pollution intensive firms are also capital intensive, benefits from lack environmental regulation would offset relative higher price in host country → Deter or reduce investments → Smaller effect on pollution in host country than theoretical predictions by Pollution Haven Hypothesis.
3. **Chain-Effect Hypothesis:** FDI → Technology improvement → Upgrade/ Improve host country environmental standards → Improve existing guest country environmental standards → Universal environmental standard (eg. ISO 14001).





Equation: UNTITLED    Workfile: UNTITLED::Untitled\

View   Proc   Object   Print   Name   Freeze   Estimate   Forecast   Stats   Resids

Dependent Variable: FDI  
Method: Least Squares  
Date: 03/21/18   Time: 02:45  
Sample (adjusted): 1977 2508  
Included observations: 367 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
PCIRATE	-428561.4	1264704.	-0.338863	0.7349
CO2LIQKT	102.7786	26.91594	3.818504	0.0002
CO2KT	-43.68080	11.76232	-3.713620	0.0002
C	-86222444	88098083	-0.978710	0.3284

R-squared	0.048408	Mean dependent var	-1.38E+08
Adjusted R-squared	0.040543	S.D. dependent var	3.32E+08
S.E. of regression	3.25E+08	Akaike info criterion	42.04584
Sum squared resid	3.83E+19	Schwarz criterion	42.08841
Log likelihood	-7711.412	Hannan-Quinn criter.	42.06276
F-statistic	6.155297	Durbin-Watson stat	2.033951
Prob(F-statistic)	0.000432		

➤ Greater R-Squared & Adjusted R-Squared value indicate greater variability usually in percentage.

- **Durbin Watson Stat (D):** Detect the presence of autocorrelation of the regression
- Value lies between 0 and 4 ( $0 < D < 4$ ).
  - $D < 2$  : There is positive correlation.
  - $D = 2$  : No correlation.
  - $D > 2$  : Successive error term are negatively correlated.

# Findings Econometric Study

**1. Coefficient:** Indicate changes of absolute value in independent variables for every one-unit change of FDI

**2. Probability:** P-Value  $\leq$   $\alpha$ -Value (0.05). IV are significant

**3. Durbin-Watson Stat :** There is no correlation which is good.

## Running White Test:

Test variance of error in regression model is constant that is homoscedasticity.



# FINDINGS

## Econometrics Study

	FDI	PCIRATE	CO2LIQKT	CO2KT
FDI	1.000000	-0.093827	-0.006136	-0.090367
PCIRATE	-0.093827	1.000000	0.576864	0.668662
CO2LIQKT	-0.006136	0.576864	1.000000	0.922349
CO2KT	-0.090367	0.668662	0.922349	1.000000

### Correlation Test between Variables:

1. Values indicate the correlations between variables in percentage
2. Positive (+ve) sign indicate both variables are related in the same direction
3. Negative(-ve) sign indicate both variables are related in the opposite direction.

# FINDINGS

## Conclusions

Equation: UNTITLED    Workfile: UNTITLED::Untitled\

View Proc Object Print Name Freeze Estimate Forecast Stats Resids

Dependent Variable: FDI  
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Carbon Dioxide Emissions from Liquid Fuel Consumption (CO<sub>2</sub>LIQKT)



Carbon Dioxide Emissions from Burning of Fossil Fuels and the Manufacture of Cement (CO<sub>2</sub>KT)

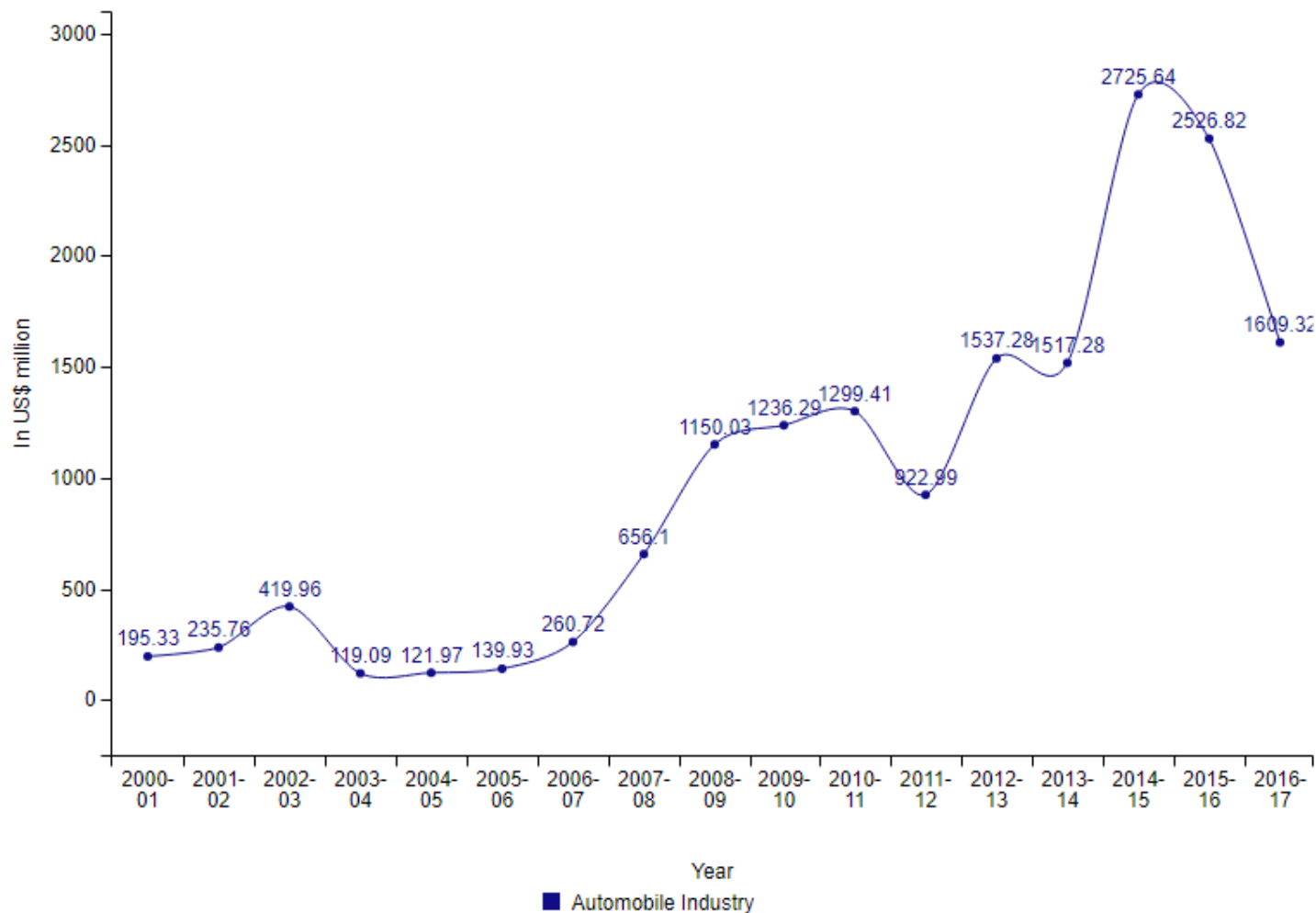
WHY +VE ? : ↑ FDI → ↑  
Land vehicles that  
cause CO<sub>2</sub>LIQKT

WHY -VE ? :  
Following slides  
will explain it

# FINDINGS

## Conclusions

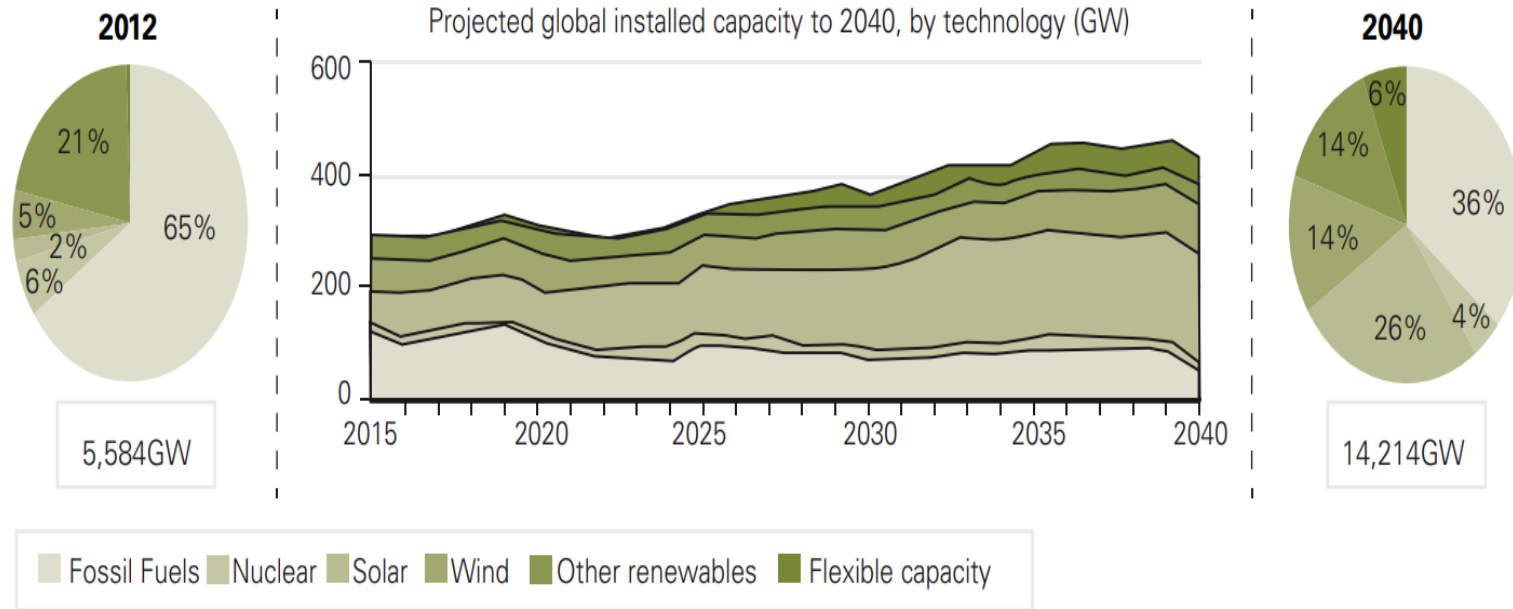
FDI Equity Inflows in Automobile Industry from 2000-01 to 2016-17



# FINDINGS

## Conclusions

### Annual Capacity additions, 2015-40 (GW)

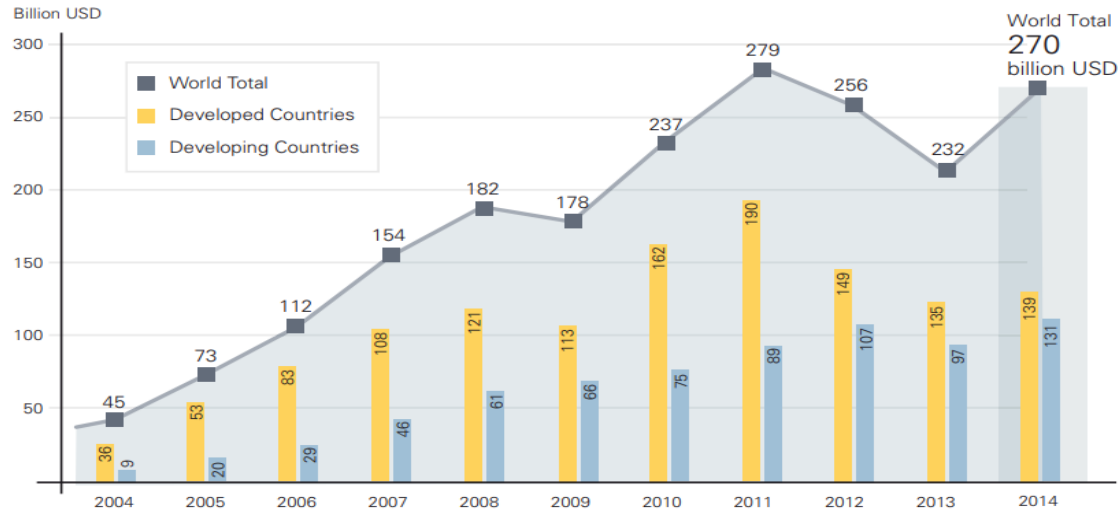


Source: Bloomberg New Energy Finance

- Fossil Fuel expected to decrease 20% from 2012 to 2040.
- Solar Energy expected to increase 24% from 2012 to 2040..

# Global investment in renewable energy production

Global New Investment in Renewable Power and Fuels,  
Developed and Developing Countries, 2004–2014

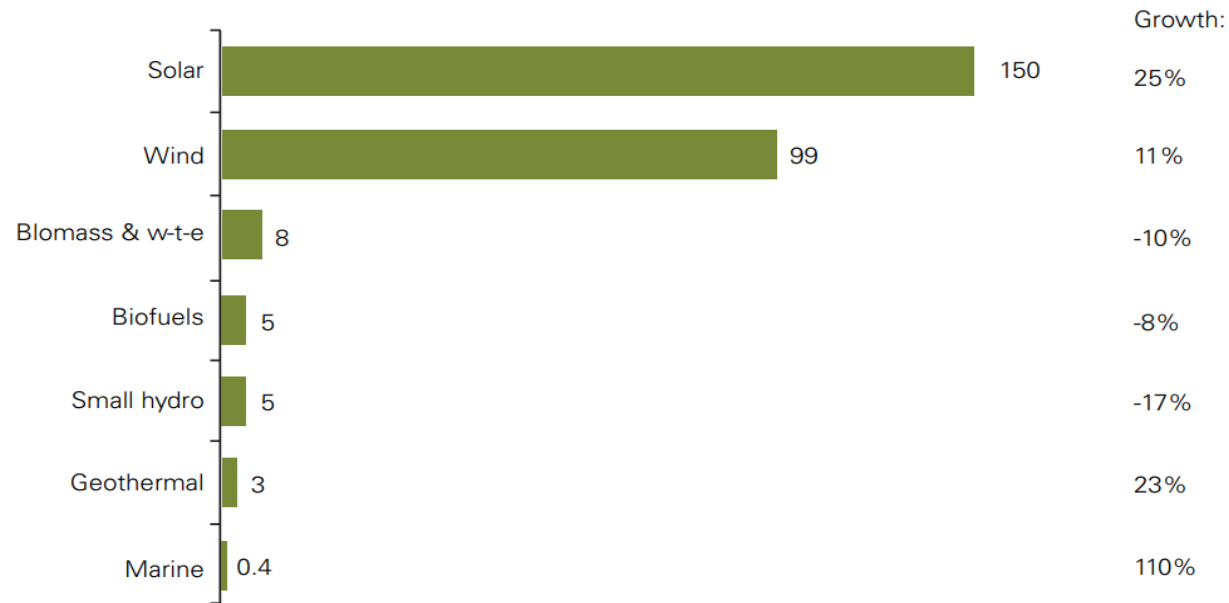


Does not include investment in hydropower > 50 MW

## FINDINGS

## Conclusions

### Global new investment in renewable energy by sector, 2014 compared to 2013, US\$ billions



New investment volume adjusts for re-invested equity. Total values include estimates for undisclosed deals.

Source: UNEP, Bloomberg New Energy Finance.

## FINDINGS Conclusions



# QUESTIONS

