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The Impacts of Oil Price Fluctuations on Revealed Comparative Advantage of Manufacturing Commodities for ASEAN-5 Economies

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ABSTRACT

This paper attempts to quantify the effects of oil price fluctuations on revealed symmetric comparative advantage (RSCA) for 95 manufacturing commodities of 5 ASEAN countries from 1991 to 2012. Using Zellner's (1962) seemingly unrelated regression model, oil price fluctuations negatively affect RSCA of more than 60% of the manufacturing commodities estimated. This is true especially for low-technology (LT1 and LT2) and medium-technology (MT3) commodities. The paper also found that endowment variables such as labour and capital stock significantly affects RSCA for more than 50% of the equations, giving support to Ricardian and Heckscher-Ohlin theorem of comparative advantage.

Keywords: Revealed Comparative Advantage, Oil Price Shocks, International Trade
JEL Classifications: C33, F11, N50

1. INTRODUCTION

Over the period 1991-2012, the price of crude oil fluctuated significantly, with mean, minimum, and maximum values of US$52, US$15, and US$139 a barrel respectively. When oil prices rise suddenly, the overall inflation rate is temporarily pushed up because other prices do not instantly adjust and fall. At the same time, because energy is an important input in the manufacturing production process, the price shock raises the cost of production (Moradkhani et al., 2010). The most extensively explored theories on the direct effects of oil price fluctuations on production costs include the input-cost effect, in which a higher energy cost lowers oil usage that in turn lowers productivity in terms of capital and labor, and the income effect, whereby a higher cost of imported oil reduces the disposable income of households.

For producers, the input-cost effects of fluctuations in oil prices may affect revenue, expenditure, and comparative advantage (and therefore the international trade position) of their firms. The principle of comparative advantage is at the heart of trade theory. The determinants of comparative advantage, however, differed among trade theories. The Ricardian theory explained comparative advantage from costs and technological differences, while the Heckscher-Ohlin-Samuelson theory considered factor price differences. The neo-factor-proportion theory looked at factor efficiency, but the technology gap and product cycle theory examined technological innovation and such soft technological change as learning-by-doing as the cause of comparative advantage differences. The differences in sources of comparative advantage explained via these trade theories suggest that comparative advantage could change if there are changes in labor productivity or the composition of capital and labor in the production of goods and may also shift overtime as technology progresses.

As noted by Bhagwati (1998), comparative advantage can also change when there are variations in production costs, a phenomenon referred to as "kaleidoscope" or "knife-edge" comparative advantage. For example, when oil prices increase, the inelastic demand curve for oil means that total spending on oil imports increases. This puts pressure on the exchange rate and depreciates the local currency. This depreciation, in turn, may affect trade performance and hence the comparative advantage of producers. Even if depreciation increases the aggregate demand for oil-importing countries, prices may increase owing to the exchange rate pass-through, and lower output may occur through higher input costs (Berument et al., 2005). Hunt et al., (2001) add that an increase in input costs due to increased oil price can drive down non-oil potential output supplied in the short run given existing capital stock and sticky wages.

The fact that comparative advantage can change when there are variations in production costs, productivity, or composition of inputs suggests a possible causality running from oil price fluctuations to comparative advantage. Although many researchers have considered the relationship between oil price movements and macroeconomic variables in the last few decades[1], little or no study substantiates the role of oil price fluctuations on comparative advantage. Therefore, the main purpose of the paper is to investigate the impact of oil price fluctuations on countries' comparative advantage. As pre-trade data are difficult to observe[2], the estimation of comparative advantage is often based on post-trade values. The "revealed comparative advantage" (RCA) approach, pioneered by Balassa (1965, 1977, 1979 and 1986), assumed that the true pattern of comparative advantage can be observed from post-trade data. This is a common approach to analyzing trade data. The use of Balassa index however, has been subject to several critiques, leading to some authors to propose modified versions. Accordingly, this paper uses the transformation suggested by Dalum et al. 1998, known as revealed symmetric comparative advantage (RSCA).

The analysis of oil price fluctuations on RSCA is focused on the manufacturing sector of five ASEAN[3] countries, namely Malaysia, Thailand, Indonesia, Singapore and the Philippines, commonly referred to as the ASEAN-5. The manufacturing sector is a major structural component of economic activities, often regarded as the basic driving force of economic activities among ASEAN countries. Of the five major ASEAN countries, Malaysia, Thailand and Indonesia economies are driven mainly by manufacturing sector while Singapore and the Philippines economies are mainly driven by the service sector (Table 1). Manufacturing production is chosen as the output measure of RSCA since oil prices should be linked most closely to the manufacturing sector. While manufacturing sectors depend largely on the development of skills and equipment, its activities also draw from a wide range of resources and raw materials, such as oil, that are subject to fluctuations both in terms of price and input supply. In terms of energy use, energy intensity in the manufacturing sector is usually higher than in any other sector. As world oil prices continue to increase, this may raise costs of production, thus affecting manufacturers' comparative advantage.

Table 1: ASEAN economic structure

Agriculture: Manufacturing: Services	1992	1997	2002	2007	2012
ASEAN	21:42:37	05:30:65	04:28:68	03:29:69	n.a.
Malaysia	15:41:4	11:45:44	09:45:46	10:45:45	10:41:49
Thailand	12:38:50	9:41:50	9:43:48	11:45:44	12:40:48
Singapore	1:33:66	00:33:67	00:32:68	00:29:71	00:27:73
Philippines	22:33:45	19:32:49	13:35:52	12:33:55	13:32:55
Indonesia	19:40:41	16:44:40	15:45:40	14:47:39	13:44:43

Source: World Bank

Looking back three decades, studies showed that many ASEAN economies have experienced a dynamic process of changing comparative advantage (Isogai et al. (2002), James and Movshuk (2003), Ng and Yeats (2003), Roland (2003), Hinloopen and Marrewijk (2004a; 2004d) Batra and Khan (2005), Wörz (2005) and Widodo (2009) among others. This entailed a rapid growth in their exports of manufacturers as well as a changing structure of manufactured exports. While most studies linked the dynamic changes in comparative advantage due to increased integration processed in the world market, growing competition from China and India, and FDI-led technological innovations, no link has been made as to how significant is the role of oil price fluctuations in causing the comparative advantage of manufacturers to change. This paper extends the existing literatures in this direction to examine the changes in comparative advantage as measured by the RSCA index consequent upon the changes in oil prices in the manufacturing sector of ASEAN-5 from 1991 to 2012.

To estimate the impacts of oil price fluctuations on RSCA, this paper employs an unrestricted system of equations for ASEAN-5 countries using annual panel data from 1991 to 2012 for 95 RSCA indices. The 95 RSCA indices are derived from 95 exports of manufacturing commodities from UN Standard International Trade Classification (SITC) trade data at the three-digit level. The paper then divides these 95 RSCA indices into three groups according to Lall's (2000) technological classification of manufacturing exports. Using Lall's specification, there are 43 commodities in the low-technology manufactures (LT1 and LT2), 34 commodities in the medium-technology manufactures (MT1 and MT3) and 18 commodities in the high-technology manufacturers (HT1 and HT2). With each classification representing a system of equations, the paper employs Zellner's (1962) seemingly unrelated regression (SURE) model to estimate the panel impacts of oil price fluctuations on RSCA for ASEAN-5 from 1991 to 2012.

The main finding to emerge from this study is that oil price fluctuations negatively affect RSCA of more than 60% of the

1 Rasche and Tatom (1977, 1981), Burbidge and Harrison (1984), Hamilton (1983), Mork (1989), Gisser and Goodwin (1986), and Lee and Ratti (1995), have provided empirical evidence that rising oil prices reduce output and increase inflation.

2 Except in the case of Bernhofen and Brown (2004), who provided the first direct test of the theory of comparative advantage in terms of a country's relative autarky prices for the case of Japan in the nineteenth century. Based on the correlation version of the law of comparative advantage developed by Deardorff (1980), Bernhofen and Brown (2004) found that Japan's autarky price value of trade is negative for each single year of the sample period 1868-1875. This provides strong empirical support for the prediction of the theory of comparative advantage at autarky price (or pre-trade price).

3 ASEAN was established in 1967 to accelerate economic growth, promote regional peace and stability, and enhance cooperation on economic, social, cultural, technical, and educational matters. The five founding countries- Indonesia, Malaysia, the Philippines, Singapore, and Thailand were later joined by Brunei Darussalam (Brunei) in 1984, Vietnam (1995), Burma (1997), Laos (1997), and Cambodia (1999).

manufacturing commodities estimated. This is true especially for LT1 and LT2 and MT3 commodities. The paper also found that endowment variables such as labour and capital stock significantly affects RSCA more than 50% of the equations, giving support to Ricardian and Heckscher-Ohlin theorem of comparative advantage.

This paper begins with a brief discussion on the theoretical background to the theory of comparative advantage and discusses how oil price fluctuations may affect comparative advantage. Data and methods are discussed in the next section. This is followed by the presentation of empirical results as well as the analysis of the findings. Finally, concluding remarks are given at the end of the paper.

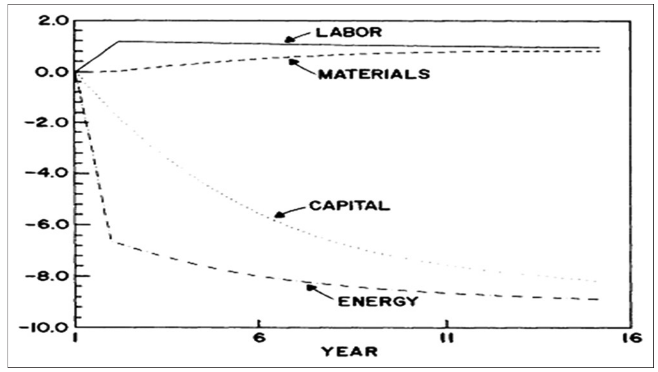
2. THEORETICAL FRAMEWORK: OIL PRICE FLUCTUATIONS AND COMPARATIVE ADVANTAGE

The purpose of this section is to illustrate the theoretical link between oil price fluctuations and comparative advantage. Currently, there is no formal economic theory that establishes the relationship between oil price fluctuations and comparative advantage. The following models are appropriate because the Ricardian and H-O theories of comparative advantage are explained by relative differences in labor productivity and the factor abundance of inputs. Differences in the sources of comparative advantage proposed by these two trade theories suggest that comparative advantage could change if there are changes in labor productivity or in the composition of capital and labor in the production of a good. Based on work by Pindyck and Rotemberg (1983), Hamilton (1988), and Lilien (1982), this section will demonstrate how changes in oil price may affect the allocation of factor endowments and input costs henceforth their likely effect on comparative advantage.

The first model considered is a putty-putty model developed by Pindyck and Rotemberg (1983). Their model focuses on the impact of oil price shock on capital stock and energy use. The key features of the model are that capital and energy are highly complementary and that capital is subject to adjustment costs. However, the model assumes that any adjustment costs on labor are small. Because of adjustment costs, the capital stock moves slowly over time in response to changes in oil prices, but labor does not. Since energy and capital are highly complementary in production, energy moves slowly as well. In the long run, the capital stock adjusts to permanent differences in energy prices, and so does energy use.

The basic mechanism of the model implies that capital stock falls substantially when oil price rises. Figure 1 shows a simulation of the effect of an unanticipated 10% increase in the price of oil. The major impact is a significant drop in the use of both capital and oil (which are complements), while labor use remains unchanged. Because of adjustment costs, capital falls gradually, while energy, a flexible factor, falls by a significant amount in the first period, and continues to fall in subsequent periods in conjunction with the

Figure 1: Simulation of Pindyck and Rotemberg's (1983) Model



Source: Pindyck and Rotemberg (1983) p. 1076

drop in the use of capital. Three-fourths of the total drop in capital occurs in seven years, so that substantial net disinvestment occurs during the first 2 or 3 years. While labor use remains unchanged, a drop in capital stock may cause output to fall and could affect comparative advantage in an energy-intensive sector.

The second model is based on Hamilton's (1988) neoclassical model of unemployment. Hamilton's analysis centered on the reallocation of labor between sectors following an oil price shock. He showed that a large fluctuation in output could be generated by seemingly small disruptions in the supply of primary commodities such as oil. The principal mechanism of the business cycle explored by Hamilton is the possibility that an oil price increase will depress purchases by consumers of energy-using goods such as cars. The dollar value of such purchases may be large relative to the value of the energy they use. If labor were able to relocate smoothly from one sector to another, most of the lost output would be made up by gains in other sectors. On the other hand, if there are costs or delays associated with labor mobility, then the losses of one sector need not be regained by another, and the short-term aggregate loss can exceed the dollar value of the lost energy by a substantial margin.

In other words, a drop in the output of Sector 1 may not necessarily be matched by an increase in the output of Sector 2. While displaced workers from Sector 1 may choose unemployment, Sector 2 will not see an increase in output in the short run. Moreover, the period of unemployment is not necessarily limited by the amount of time necessary to relocate. If there is some probability of a return to better conditions, unemployed workers from Sector 1 may rationally choose not to relocate, even if jobs offered in Sector 2 pay a wage that exceeds their marginal utility of leisure. Correspondingly, the decline in the output of Sector 1 may translate into a lower comparative advantage for Sector 1, at least in the short run.

Oil price changes may also induce resource reallocation, for example from more adversely influenced sectors to those less adversely influenced, and such reallocation is costly (Lilien, 1982). According to the dispersion hypothesis by Lilien, oil price hikes lead to a reallocation of resources from energy-intensive to energy-efficient sectors. Such real locative shocks necessitate a movement of labor out of adversely affected industries. As this reallocation progresses gradually because, for instance, workers have industry-specific skills or simply because of the time-consuming nature of job searching, a short-term decline in output results, involving considerable unemployment in the interim. To some extent, oil price hikes induce firms to relocate inputs across sectors so as to achieve optimal production levels, and this may directly or indirectly affect the comparative advantage of countries owing to the costly adjustment costs involved.

3. DATA AND EMPIRICAL METHOD

Data for 95 manufacturing export commodities are obtained from the UN Comtrade Database based on Revision 3 of the Standard International Trade Classification (SITC Rev. 3) at the three-digit level. RSCA indices are calculated for the 95 manufacturing export commodities and segregated into three groups according to Lall's (2000)[4] technological classification of exports. The three groups are LT manufactures, MT manufactures and HT manufacturers. Each group has two sub-groups as illustrated in Table 2. In this paper, resource-based (RB) manufactures and MT2 category from MT manufactures are omitted from study. This is done to best reflect the position of ASEAN-5 countries as a hub for E and E exports and labor-intensive manufacturing commodities.

For econometric estimation, the paper uses variables suggested in traditional trade theory and augmented by recent literature for determinants of comparative advantage. The variables are defined as follows:

RSCA by Dalum et al. (1998) is chosen to measure comparative advantage. The RSCA index is a simple decreasing monotonic transformation of RCA or Balassa index (Balassa, 1965). RCA index is formulated as follows:

$$RCA_{ij}=(X_{ij}/X_{in})/(X_{rj}/X_{rn}) \tag{1}$$

where RCA$_{ij}$ represents revealed comparative advantage of country *i* for group of products (SITC) *j*; and X$_{ij}$ denotes total exports of country *i* in group of products (SITC) *j*. Subscript *r* refers to all countries without country *i*, and subscript *n* refers to all groups of products (SITC) except group of product *j*. The values of the index vary from 0 to ∞. RCA$_{ij}$ greater than one means that country *i* has comparative advantage in group of products *j*. In contrast, RCA$_{ij}$ less than one implies that country *i* has comparative disadvantage in group of products *j*. Since RCA$_{ij}$ turns out to produce values that cannot be compared on both sides of one, Dalum et al. (1998) proposed RSCA index, which is formulated as follows:

$$RSCA_{ij}=(RCA_{ij}-1)/(RCA_{ij}+1) \tag{2}$$

The values of RSCA$_{ij}$ index can vary from minus one to one (or –1 RSCA$_{ij}$ 1). RSCA$_{ij}$ >0 implies that country *i* has comparative advantage in group of products *j*. In contrast, RSCA$_{ij}$ <0 imply that country *i* has comparative disadvantage in group of products *j*.

4 Within manufactured exports, there are four technological categories as defined in Lall's (2000). These are RB manufactures, LT manufactures, MT manufactures and high-technology (HT) manufacturers.

Real oil price (ROIL) is world crude oil price based on Dubai crude, deflated with base year 2005 = 100, and is expressed in US Dollar. The nominal oil prices and wholesale price index are taken from World Development Indicators.

Real gross domestic product (RGDP) measures the output of final goods and services produced and incomes earned at constant US dollars. RGDP is used as a proxy for technological progress of countries. RGDP is expected to correlate positively with RSCA for HT commodities and correlate negatively for LT commodities. RGDP was rebased with base year 2005 = 100. The data on GDP is obtained from World Development Indicators.

Manufacturing value added (MANV) measures the contribution of the manufacturing sector to total production. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. The relative size of the manufacturing industry is a significant indicator of the state of the economy. Changes in MANV may reflect changes in the relative importance of the manufacturing sectors of countries. The series originates from World Development Indicators.

Trade openness (OPEN) is defined as trade (imports + exports)/GDP. Countries with a higher "openness" index are expected to be more competitive owing to increased competition from increased trade and *vice versa*. The data set for exports and imports originates from the UN COMTRADE database.

Real FDI is the investment of foreign assets into domestic structures, equipment, and organizations. It does not include foreign investment into stock markets. FDI is an important determinant of a country's comparative advantage, as shown in studies by Dunning (1993) and Driffield and Munday (2000). The series is obtained from World Development Indicators.

The real capital stock (CAPITAL) is measured using gross fixed capital formation at current market price. The H-O model emphasizes international differences in relative factor endowments. The capital stock measure is therefore an essential variable to capture the relative differences in factor endowments that contribute to a country's RSCA. The series is obtained from World Development Indicators.

The total labor force labor is based on World Bank population estimates that include the armed forces, the unemployed, and first-time job seekers, but excludes homemakers and other unpaid caregivers and workers in the informal sector. Similar to capital stock, L would capture the relative differences in factor endowments among countries, as outlined by traditional trade theory. The series originates from World Development Indicators.

Oil demand (OILDD) is expressed in kbbl/d (thousands of barrels per day). The oil demand variable measures the amount of oil consumption in a country for domestic use. Country with high oil consumption would typically be more susceptible to oil price

Table 2: Technological classification of manufacturing exports

Low technology	Medium technology manufactures	High technology manufactures
LT1: Textile, Garment and Footwear	MT1: Automotive	HT1: Electronic and Electrical
611 Leather	781 Pass Motor Veh Exc Buses	716 Rotating Electric Plant
612 Leather etc Manufactures	782 Lorries, Spcl Mtr Veh Nes	718 Oth Power Generatg Machy
613 Fur Skins Tanned, Dressed	783 Road Motor Vehicles Nes	751 Office Machines
651 Textile Yarn	784 Motor Veh Prts, Acces Nes	752 Automtic Data Proc Equip
652 Cotton Fabrics, Woven	785 Cycles, etc Motrzd or not	759 Office, Adp Mch Pts, Acces
654 Oth Woven Textile Fabric	MT3: Engineering	761 Television Receivers
655 Knitted, etc Fabrics	711 Steam Boilers and Aux Plnt	764 Telecom Eqpt, Pts, Acc Nes
656 Lace, Ribbons, Tulle, etc	713 Intrnl Combus Pstn Engin	771 Electric Power Machy Nes
657 Special Txtl Fabrc, Prods	714 Engines and Motors Nes	774 Electro-Medcl, Xray Equip
658 Textile Articles Nes	721 Agric Machy, Exc Tractors	776 Transistors, Valves, etc.
659 Floor Coverings, etc	722 Tractors Non-Road	778 Electrical Machinery Nes
831 Travel Goods, Handbags	723 Civil Engneerg Equip etc	HT2: Other
842 Mens Outerwear not Knit	724 Textile, Leather Machnry	524 Radioactive etc Material
843 Womens Outerwear Nonknit	725 Paper etc Mill Machinery	541 Medicinal, Pharm Products
844 Under Garments not Knit	726 Printg, Bkbindg Machy, Pts	712 Steam Engines, Turbines
845 Outerwear Knit Nonelastc	727 Food Machry non-Domestic	792 Aircraft etc
846 Under Garments Knitted	728 Oth Machy for Spcl Indus	871 Optical Instruments
847 Textile Clthng Acces Nes	736 Metalworking Mach-Tools	874 Measurng, Controlng Instr
848 Headgear, Nontxtl Clothng	737 Metalworking Machnry Nes	881 Photo Apparat, Equipt Nes
851 Footwear	741 Heating, Cooling Equipmnt	
LT2: Other Products	742 Pumps for Liquids etc	
642 Paper, etc, Precut, Arts of	743 Pumps Nes, Centrfuges etc	
665 Glassware	744 Mechanical Handling Equ	
666 Pottery	745 Nonelec Machy, Tools Nes	
673 Iron, Steel Shapes etc	749 Nonelec Mach Pts, Acc Nes	
674 Irn, Stl Univ, Plate, Sheet	762 Radio Broadcast Receivrs	
675 Iron, Steel Hoop, Strip	763 Sound Recordrs, Phonogrph	
676 Railwy Rails etc Irn, Stl	772 Switchgear etc, Parts Nes	
677 Irn, Stl Wire (Excl W Rod)	773 Electr Distributng Equip	
679 Irn, Stl Castings Unworkd	775 Household Type Equip Nes	
691 Structures and Parts Nes	793 Ships and Boats etc	
692 Metal Tanks, Boxes, etc	812 Plumbg, Heatng, Lghtng Equ	
693 Wire Products non Electr	872 Medical Instruments Nes	
694 Stl, Coppr Nails, Nuts, etc	873 Meters and Counters Nes	
695 Tools	884 Optical Goods Nes	
696 Cutlery	885 Watches and Clocks	
697 Base Mtl Household Equip	951 War Firearms, Ammunition	
699 Base Metal Mfrs Nes		
821 Furniture, Parts There of		
893 Articles of Plastic Nes		
894 Toys, Sporting Goods, etc		
895 Office Supplies Nes		
897 Gold, Silver Ware, Jewelry		
898 Musical Instruments, Pts		
899 Other Manufactured Goods		

Source: Lall, S. (2000)

fluctuations. The variable is intended to represent countries with varying oil dependencies. The paper therefore expects a negative correlation between oil demand and RSCA. The series is obtained from the IEA.

3.1. Econometric Estimation of Oil Price Fluctuations on RSCA

To test the impacts of oil price fluctuations on RSCA, panel regressions analysis for 3 ASEAN countries from 1991 to 2012 are estimated. There are 95 equations to estimate; each equation represents an SITC commodity from the 95 SITC commodities at three-digit level listed in Table 2. The 95 equations are clustered into six categories based on Lall's (2000) technological classification of exports: LT (LT1 and LT2), MT (MT1 and MT3) and high technology (HT1 and HT2). Each group of equations is then estimated together as a system of SURE whereby equations within each group are linked through the disturbance term. One advantage of the SURE model is that it allows for more-efficient estimation if there are common shocks to the dependent. Cross-equation correlation in the disturbance term may exist because the RSCA in one commodity may impact the RSCA on other commodities.

For SURE estimation to be valid, cross-equation correlation in the disturbance term must exist. To test for contemporaneous covariance of the disturbances across equations such that $E(\mu_{it}, \mu_{jt})$ are nonzero, whereas the non-contemporaneous covariance $E(\mu_{it}, \mu_{j't-k})$ all equal zero. The null hypothesis of no contemporaneous correlation (H0: $\sigma_{ij} = 0$, for $i \neq j$) can be tested by the Breusch and Pagan test statistic (λ), given as

$$\lambda = T\sum_{i=2}^{N}\sum_{j=1}^{N-1} r_{ij}^{2} \tag{3}$$

which is asymptotically distributed as chi-squared (χ^2) with N (N−1)/2 degrees of freedom, and r_{ij} is the correlation coefficient of residuals estimated using SURE.

The number of equations to estimate in each SURE group differs according to the number of commodities listed in each technological content classification. Based on Table 2, there are 19 equations in LT1 category, 24 equations in LT2 category, 5 equations in MT1 category, 29 equations in MT3 category, 11 equations in HT1 category and 7 equations in HT2 category. Using these groupings, the SURE regressions will look at the impact of oil price fluctuations on RSCA from 1991 to 2012, using the following equation:

$$logRSCA_{jit} = \beta_0 + \beta_1 logROIL_{jit} + \beta_2 logRGDP_{jit} + \beta_3 logOPEN_{jit} + \beta_4 logMANV_{jit} + \beta_5 logCAPITAL_{jit} + \beta_6 logLABOR_{jit} + \beta_7 logFDI_{jit} + \beta_8 logOILDD_{jit} + \varepsilon_{jit} \tag{4}$$

where j = the equation number (1 = low technology LT1, 2 = low technology LT2, 3 = medium technology MT1, 4 = medium technology MT3, 5 = high technology HT1 and 6 = high technology HT2).

i = the countries (I = 1,2.,5)
t = the year (1 = 1991,…. 2012)

4. ESTIMATION RESULTS

This section discusses the results obtained from the SURE estimations and the Breusch–Pagan test of serial independence. Results of the estimations are summarised in Table 3. SURE estimations are based on a 10% level of significance.

4.1. Results of Breusch-Pagan Test of Serial Independence

The Breusch–Pagan tests of serial independence between the residuals for each SURE regression are reported at the bottom of Table 3. Results show that the Chi-square estimates are significant at 1% level for all set of equations. This demonstrates that the residuals within each SURE system are not independent and therefore that SURE is an appropriate technique. The Breusch–Pagan tests also suggest that each set of equations are jointly determined, which means that the RSCA in one commodity impacts the RSCA in another commodity within the same factor content classification system.

4.2. Results from Estimation of SURE Regression

Equation (4) estimates a panel of five ASEAN countries in the regression for 95 SITC commodities at 3-digit level. There are six systems of equations, each representing Lall's (2000) technological classification of manufacturing exports: LT (LT1 and LT2), MT (MT1 and MT3) and HT (HT1 and HT2). Results of SURE regressions are summarized in Table 3 (full results are available in Appendix 1). In general, oil price fluctuations (ROIL) negatively affect RSCA for more than 60% of the 95 equations. Specifically, Table 3 shows that 25 of 43 equations of the oil price variable in the LT commodities are significantly <0. Similarly, the oil

Table 3: Summary of results from SURE regressions of 95 manufacturing commodities

Coefficient	β<0	β=0	β>0	Coefficient	β<0	β=0	β>0	Coefficient	β<0	β=0	β>0
Real oil price				Real GDP				Real FDI			
Low Tech: LT1	12	2	5	Low Tech: LT1	16	3	0	Low Tech: LT1	1	8	10
Low Tech: LT2	13	8	3	Low Tech: LT2	16	8	0	Low Tech: LT2	2	13	9
Medium Tech: MT1	1	2	2	Medium Tech: MT1	3	2	0	Medium Tech: MT1	0	3	2
Medium Tech: MT3	23	5	1	Medium Tech: MT3	10	16	3	Medium Tech: MT3	0	10	19
High Tech: HT1	7	4	0	High Tech: HT1	4	5	2	High Tech: HT1	1	5	5
High Tech: HT2	3	2	2	High Tech: HT2	2	5	0	High Tech: HT2	6	1	0
Number of coefficients	59	23	13	Number of coefficients	51	39	5	Number of coefficients	4	45	46
Capital stock				Manufacturing value added				Labor			
Low Tech: LT1	2	12	5	Low Tech: LT1	12	7	0	Low Tech: LT1	2	10	7
Low Tech: LT2	10	12	2	Low Tech: LT2	2	8	14	Low Tech: LT2	4	11	9
Medium Tech: MT1	1	3	1	Medium Tech: MT1	3	2	0	Medium Tech: MT1		3	2
Medium Tech: MT3	4	21	4	Medium Tech: MT3	2	23	4	Medium Tech: MT3	7	13	9
High Tech: HT1	4	3	4	High Tech: HT1	2	7	2	High Tech: HT1	3	5	3
High Tech: HT2	2	3	2	High Tech: HT2	1	4	2	High Tech: HT2	4	2	1
Number of coefficients	23	54	18	Number of coefficients	7	57	31	Number of coefficients	20	44	31
Oil demand				Trade openness				Constant			
Low Tech: LT1	4	7	8	Low Tech: LT1	6	8	5	Low Tech: LT1	2	3	14
Low Tech: LT2	4	11	9	Low Tech: LT2	15	6	3	Low Tech: LT2	6	9	9
Medium Tech: MT1		3	2	Medium Tech: MT1	1	3	1	Medium Tech: MT1	2	3	0
Medium Tech: MT3	4	16	9	Medium Tech: MT3	11	13	5	Medium Tech: MT3	3	11	15
High Tech: HT1	2	8	1	High Tech: HT1	3	3	5	High Tech: HT1	1	6	4
High Tech: HT2	1	5	1	High Tech: HT2	2	3	2	High Tech: HT2	2	2	3
Number of coefficients	15	50	30	Number of coefficients	38	36	21	Number of coefficients	16	31	48
Breusch-Pagan test of independence's χ^2***				Medium Tech: MT1: P=0.0000***;				High Tech: HT1: P=0.0000***;			
Low Tech: LT1: P=0.0000***;				Medium Tech: MT3: P=0.0000***				High Tech: HT2: P=0.0000***			
Low Tech: LT2: P=0.0000**											

SURE: Seemingly unrelated regression

price variable is negative and significant at the 10% level for MT commodities for 70% of the equations. For HT commodities, the oil price variable is negatively significant for more than half of the equations. These findings are in line with the putty-putty model of Pindyck and Rotemberg (1983) and Hamilton (1988) neoclassical model of unemployment on the impacts of oil price shocks on resource allocation, input costs and comparative advantage.

For oil demand (OILDD), results are mixed. Quite remarkably, OILDD is positively significant in 30 of the estimated equations as compared to 15 negatively significant equations. This is true particularly for LT1, LT2, MT1 and MT3 commodities. The results cast doubts on the conventional view such that the higher is the demand for oil, the more susceptible the economy (and to certain extent comparative advantage) are to oil shock. While oil price fluctuations are found to be adversely affecting RSCA in most commodities groupings, the impact of oil demand on RSCA may be less direct. A plausible explanation stems on fact that oil price fluctuations affect RCSA via changes in input prices and displacement of workers. Whereas impacts of oil demand on RSCA may depend whether the country is a net oil exporter or a net oil importer. In the case of ASEAN-5 economies, Malaysia and Indonesia are net oil exporters. Oil exports contribute around 6 percent and 9 percent respectively for Malaysia's and Indonesia's annual domestic revenue. Singapore, although without any oil resource has a booming oil refinery industry that accounts for 6 percent of the city-state's economy. The Philippines despite being a net oil-importing country consumes oil only a third of that of Thailand (International Energy Agency, 2011). Taking these into consideration, the economic stimulus provided by oil export earnings in Malaysia, Indonesia and Singapore would be less than outweighed by the depressive effect of higher prices on economic activity in Thailand and the Philippines. Thus, lending support to the positive correlation between OILDD and RSCA in this paper.

RGDP is negatively significant for 60% of the 74 equations estimated for LT and MT commodities combined. Since RGDP is used as proxy for technological progress, results suggest that as the economies grow, ASEAN-5 countries shift away from LT and MT commodities to HT manufacturing commodities. Likewise, trade openness (OPEN) is negatively related to RSCA for 40% of equations estimated particularly for LT2 and MT3 commodities. Although openness to trade increases competition, it could hamper growth as previously documented by Yanikkaya (2003). Thus, this finding suggests that openness to trade without the appropriate restrictions on trade could adversely impact comparative advantage.

Manufacturing value-added (MANV) is significantly greater than zero for half of the equations in the LT (LT1 and LT2) commodities, implying that the contribution of manufacturing value-added is positively associated to a country's comparative advantage. The real FDI variable is positively significant in most commodity groupings. The results conform to the previous work by Dunning (1993) and Driffield and Munday (2000) such that sectors with a higher level of foreign involvement, such as the E&E industry tend to have higher productivity. For factor endowment variables, the results lend support to H-O theorem, at least in the case of LT and HT commodities. Results show that CAPITAL variable is negatively significant for LT1 and LT2 commodities for around 30% of the estimated equations and positively significant for around 30% in the HT1 and HT2 commodities. This signifies the importance of technology and skilled labour in highly skill-intensive industries, as cited in Mora (2002) and Midelfart-Knarvik et al. (2000). For labour variable, the opposite is recorded for LT and HT commodities. Labour is significantly positive for around 40% of the LT commodities and negatively significant by 40% for HT commodities. This is consistent with previous findings in the literature. For instance, Nowak-Lehman et al. (2007) found that low labour costs improved the performance of Mexican low-cost exports.

Results from (4) suggest that oil price fluctuations adversely affect RSCA for most manufacturing commodities at different technological classifications. Results for factor endowment variables are consistent with predictions from the H-O model. Capital stock is positively related to RSCA in HT commodities, while labor supply is positively related to RSCA in the LT commodities. Real GDP are negatively correlated with RSCA in LT commodities but only 2 of 18 commodities in HT group are positively correlated to RSCA.

5. CONCLUSION

This paper has estimated the relationship between crude oil price movements and RSCA for a panel of five ASEAN countries using an unrestricted SURE method over the period 1991-2012. To test the impact of oil price fluctuations on RSCA, 95 RSCA indices were calculated from 95 manufacturing exports commodities at SITC three-digit level data. These 95 RSCA indices were divided into three groups based on Lall's (2000) technological classification of manufacturing exports. Using Lall's specification, there are 43 commodities in the LT manufactures (LT 1 and LT 2), 34 commodities in the MT manufactures (MT 1 and MT 3) and 18 commodities in the high-technology manufacturers (HT 1 and HT 2).

Findings for these estimations are summarised as follows. Oil price fluctuations adversely affect RSCA for most manufacturing commodities at all technological classifications. This conforms to the theoretical predictions of oil price shocks impact on comparative advantage proposed in this paper. Results for factor endowment variables are consistent with predictions from the Ricardian and H-O models. Capital stock is positively related to RSCA in HT commodities, while labour supply is positively related to RSCA in the LT commodities. Oil demand variable yield mixed results. Demand for oil is positively significant with RSCA for about 30% of the estimated equations compared to 15% of negatively significant coefficient estimates. This could be due to the position of Malaysia and Indonesia as net oil exporter and Singapore as oil-refinery country. The economic stimulus provided by oil-export earnings in Malaysia, Indonesia and Singapore would be less than outweighed by the depressive effect of higher prices on economic activity in Thailand and the Philippines. Hence lending support to the positive correlation between oil demand and RSCA found in this paper.

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APPENDIX 1

Low technology-LT1

Variables	(1) rsca611	(2) rsca612	(3) rsca613	(4) rsca651	(5) rsca652	(6) rsca654	(7) rsca655	(8) rsca656	(9) rsca657	(10) rsca658
ROIL	–0.27***	–0.28***	0.54***	–0.41***	–0.33***	0.12***	–0.07	0.43***	0.64***	0.18***
	(–3.631)	(–3.194)	(3.884)	(–8.473)	(–3.666)	(3.131)	(–1.045)	(6.369)	(7.411)	(3.075)
RGDP	–1.14**	–0.20	0.28	–1.30***	–1.76***	–0.80***	–2.48***	–1.49***	0.64	–0.83**
	(–2.325)	(–0.343)	(0.313)	(–4.163)	(–2.995)	(–3.356)	(–5.749)	(–3.411)	(1.141)	(–2.182)
FDI	0.06*	0.10***	–0.05	–0.00	0.02	–0.00	–0.00	0.02	–0.17***	0.01
	(1.879)	(2.579)	(–0.899)	(–0.160)	(0.565)	(–0.259)	(–0.043)	(0.641)	(–4.641)	(0.575)
CAPITAL	–0.05	–0.33***	–0.08	0.01	0.01	0.04	0.03	0.02	0.07	0.01
	(–0.919)	(–5.211)	(–0.807)	(0.228)	(0.120)	(1.464)	(0.619)	(0.418)	(1.089)	(0.322)
MANV	0.70	–0.34	–1.37	1.90***	1.68***	0.38	1.86***	0.06	0.89	–0.33
	(1.404)	(–0.582)	(–1.500)	(5.976)	(2.802)	(1.571)	(4.232)	(0.132)	(1.543)	(–0.848)
LABOR	0.31***	0.86***	0.34*	–0.01	0.09	–0.02	–0.12	0.40***	–0.26**	0.44***
	(2.792)	(6.516)	(1.658)	(–0.090)	(0.666)	(–0.310)	(–1.209)	(4.032)	(–1.998)	(5.096)
OILDD	0.85***	1.10***	0.74*	–0.23*	0.20	0.30***	–0.02	0.89***	–0.48*	0.78***
	(3.891)	(4.255)	(1.843)	(–1.652)	(0.753)	(2.758)	(–0.102)	(4.547)	(–1.886)	(4.534)
OPEN	0.02	0.04	0.03	–0.18***	–0.18***	0.05**	–0.16***	0.07*	0.28***	0.06*
	(0.581)	(0.769)	(0.434)	(–6.516)	(–3.557)	(2.536)	(–4.351)	(1.951)	(5.630)	(1.846)
Constant	1.90	–0.59	16.01**	–9.23***	2.66	7.22***	20.19***	21.19***	–32.04***	15.08***
	(0.469)	(–0.123)	(2.153)	(–3.570)	(0.546)	(3.634)	(5.639)	(5.832)	(–6.846)	(4.758)
Observations	93	93	93	93	93	93	93	93	93	93
R–squared	0.732	0.746	0.245	0.877	0.641	0.488	0.456	0.769	0.812	0.822

Standard errors in parentheses, ***P<0.01, **P<0.05, *P<0.1

Low technology-LT1 contd...

Variables	(11) rsca659	(12) rsca831	(13) rsca842	(14) rsca843	(15) rsca844	(16) rsca845	(17) rsca846	(18) rsca848	(19) rsca851
ROIL	0.00	–0.44***	–0.70***	–0.24***	–0.25***	–0.55***	–0.51***	–0.65***	–0.75***
	(0.010)	(–3.581)	(–7.108)	(–7.700)	(–7.264)	(–6.230)	(–4.795)	(–5.132)	(–5.670)
RGDP	–4.53***	–1.71**	–1.19*	–1.34***	–0.87***	–1.92***	–1.43**	–3.28***	–2.94***
	(–4.117)	(–2.162)	(–1.866)	(–6.752)	(–3.926)	(–3.360)	(–2.064)	(–4.004)	(–3.405)
FDI	0.13*	0.22***	0.16***	0.04***	0.05***	0.17***	0.17***	0.09	0.20***
	(1.846)	(4.276)	(3.784)	(2.822)	(3.233)	(4.541)	(3.728)	(1.644)	(3.596)
CAPITAL	0.23*	–0.02	0.24***	0.12***	0.15***	0.16**	0.00	–0.23***	0.13
	(1.951)	(–0.219)	(3.513)	(5.465)	(6.406)	(2.503)	(0.022)	(–2.641)	(1.386)
MANV	2.89**	–0.94	–0.14	0.97***	0.54**	0.33	–0.19	2.20***	0.95
	(2.574)	(–1.163)	(–0.213)	(4.805)	(2.408)	(0.560)	(–0.273)	(2.632)	(1.074)
LABOR	–0.12	0.62***	0.11	–0.05	–0.09*	0.18	0.36**	0.52***	0.26
	(–0.495)	(3.417)	(0.767)	(–1.134)	(–1.881)	(1.359)	(2.307)	(2.812)	(1.332)
OILDD	0.03	1.11***	–0.09	–0.24***	–0.31***	0.28	0.42	0.25	0.73*
	(0.060)	(3.125)	(–0.328)	(–2.722)	(–3.155)	(1.085)	(1.344)	(0.685)	(1.888)
OPEN	–0.10	–0.13*	0.02	0.00	0.04**	–0.05	–0.22***	–0.53***	–0.19**
	(–1.033)	(–1.943)	(0.333)	(0.007)	(1.973)	(–1.064)	(–3.595)	(–7.469)	(–2.525)
Constant	38.53***	47.10***	25.21***	10.75***	8.90***	31.10***	31.70***	29.65***	38.97***
	(4.222)	(7.175)	(4.780)	(6.530)	(4.863)	(6.554)	(5.508)	(4.367)	(5.430)
Observations	93	93	93	93	93	93	93	93	93
R–squared	0.387	0.734	0.808	0.836	0.831	0.787	0.691	0.607	0.697

Standard errors in parentheses, ***P<0.01, **P<0.05, *P<0.1

Low technology-LT2

Variables	(1) rsca642	(2) rsca665	(3) rsca666	(4) rsca673	(5) rsca674	(6) rsca675	(7) rsca676	(8) rsca677	(9) rsca679	(10) rsca691	(11) rsca692	(12) rsca693
ROIL	–0.12***	0.03	–0.15***	0.08	0.01	0.11	–0.03	0.28**	–0.25***	–0.08	–0.27***	–0.30***
	(–2.676)	(0.313)	(–3.347)	(1.577)	(0.401)	(1.122)	(–0.825)	(2.025)	(–4.527)	(–1.274)	(–5.101)	(–6.593)
RGDP	–1.13***	–2.94***	–1.35***	–1.39***	–0.59**	–1.23**	–0.85***	–0.89	0.28	–1.89***	–1.08***	–0.51*
	(–3.818)	(–4.475)	(–4.734)	(–4.090)	(–2.537)	(–1.975)	(–3.392)	(–1.000)	(0.790)	(–4.690)	(–3.144)	(–1.700)
FDI	–0.03	–0.15***	0.06***	0.02	–0.02	0.02	–0.02	–0.07	–0.03	0.02	0.00	–0.00
	(–1.639)	(–3.449)	(3.303)	(0.685)	(–1.034)	(0.550)	(–1.145)	(–1.243)	(–1.098)	(0.755)	(0.198)	(–0.223)
CAPITAL	0.05*	0.09	–0.09***	0.05	–0.01	0.02	–0.12***	0.15	–0.06	–0.06	–0.07*	–0.20***
	(1.707)	(1.273)	(–2.787)	(1.479)	(–0.397)	(0.243)	(–4.390)	(1.573)	(–1.638)	(–1.269)	(–1.848)	(–6.135)
MANV	1.47***	3.54***	0.53*	1.66***	1.01***	1.05*	0.62**	0.20	0.43	1.89***	1.33***	1.16***
	(4.861)	(5.274)	(1.824)	(4.767)	(4.232)	(1.656)	(2.392)	(0.215)	(1.177)	(4.586)	(3.780)	(3.785)
LABOR	–0.16**	–0.44***	0.62***	–0.11	–0.16***	–0.01	0.11**	–0.13	–0.06	0.09	0.08	0.12*
	(–2.342)	(–2.901)	(9.611)	(–1.465)	(–3.003)	(–0.097)	(1.993)	(–0.637)	(–0.723)	(1.019)	(1.018)	(1.830)
OILDD	–0.26*	–0.71**	0.46***	–0.17	–0.32***	0.06	0.48***	0.07	–0.06	–0.03	0.08	0.09
	(–1.957)	(–2.392)	(3.568)	(–1.124)	(–3.064)	(0.225)	(4.274)	(0.176)	(–0.402)	(–0.140)	(0.513)	(0.646)
OPEN	–0.08***	–0.20***	–0.01	–0.03	–0.07***	0.05	–0.18***	0.15*	0.01	–0.09**	–0.14***	–0.19***
	(–2.961)	(–3.549)	(–0.493)	(–1.105)	(–3.474)	(1.010)	(–8.211)	(1.904)	(0.192)	(–2.491)	(–4.616)	(–7.338)
Constant	–2.73	2.76	9.85***	–4.18	–4.40**	3.45	5.87***	14.81**	–13.19***	2.61	–3.24	–10.54***
	(–1.115)	(0.505)	(4.170)	(–1.477)	(–2.264)	(0.669)	(2.808)	(2.000)	(–4.488)	(0.782)	(–1.132)	(–4.240)
Observations	93	93	93	93	93	93	93	93	93	93	93	93
R-squared	0.619	0.494	0.922	0.685	0.582	0.210	0.696	0.184	0.637	0.588	0.686	0.830

Standard errors in parentheses, ***P<0.01, **P<0.05, *P<0.1

Low technology-LT2 contd...

Variables	(13) rsca694	(14) rsca695	(15) rsca696	(16) rsca697	(17) rsca699	(18) rsca821	(19) rsca893	(20) rsca894	(21) rsca895	(22) rsca897	(23) rsca898	(24) rsca899
ROIL	–0.14***	0.21***	–0.64***	–0.61***	–0.02	–0.58***	–0.23***	–0.17**	–0.69***	–0.02	–0.64***	0.09*
	(–2.942)	(8.835)	(–4.308)	(–4.998)	(–0.534)	(–6.284)	(–4.402)	(–2.411)	(–5.802)	(–0.264)	(–5.904)	(1.657)
RGDP	–0.35	–0.01	–2.01**	–1.98**	–0.53**	–1.82***	–0.83**	–1.40***	–1.00	–0.02	0.99	–0.35
	(–1.111)	(–0.054)	(–2.077)	(–2.513)	(–2.031)	(–3.042)	(–2.460)	(–3.009)	(–1.290)	(–0.028)	(1.404)	(–1.012)
FDI	0.01	–0.04***	0.20***	0.22***	–0.01	0.07*	0.03	0.12***	0.18***	0.06*	0.11**	0.06***
	(0.377)	(–3.869)	(3.134)	(4.261)	(–0.715)	(1.905)	(1.194)	(4.042)	(3.550)	(1.711)	(2.400)	(2.610)
CAPITAL	–0.09***	–0.01	–0.04	–0.12	–0.05*	–0.11*	–0.09**	–0.07	–0.11	–0.17***	–0.19**	0.07*
	(–2.757)	(–0.698)	(–0.346)	(–1.398)	(–1.726)	(–1.659)	(–2.502)	(–1.305)	(–1.367)	(–2.952)	(–2.527)	(1.890)
MANV	1.11***	–0.06	0.10	–0.23	0.93***	0.96	0.92***	–0.16	0.03	0.94*	–1.53**	–1.31***
	(3.428)	(–0.356)	(0.098)	(–0.284)	(3.492)	(1.576)	(2.664)	(–0.328)	(0.040)	(1.712)	(–2.124)	(–3.737)
LABOR	–0.07	–0.19***	0.32	0.71***	–0.04	0.45***	0.15**	0.50***	0.16	0.13	0.27*	0.35***
	(–0.946)	(–5.288)	(1.457)	(3.967)	(–0.730)	(3.312)	(1.972)	(4.759)	(0.937)	(1.027)	(1.687)	(4.522)
OILDD	–0.42***	0.45***	0.89**	1.29***	–0.12	0.06	–0.00	0.66***	0.73**	–0.16	1.20***	0.95***
	(–2.925)	(6.535)	(2.048)	(3.658)	(–1.020)	(0.240)	(–0.021)	(3.180)	(2.120)	(–0.661)	(3.800)	(6.201)
OPEN	–0.09***	0.08***	–0.32***	–0.24***	0.02	–0.36***	–0.06**	–0.10**	–0.34***	–0.05	–0.18***	0.13***
	(–3.416)	(5.869)	(–3.755)	(–3.530)	(0.826)	(–6.847)	(–2.036)	(–2.378)	(–5.070)	(–1.055)	(–2.967)	(4.200)
Constant	–11.01***	1.31	38.33***	37.83***	–6.21***	20.48***	–0.62	26.93***	20.62***	–19.38***	5.72	24.38***
	(–4.183)	(1.021)	(4.772)	(5.785)	(–2.876)	(4.119)	(–0.222)	(6.984)	(3.218)	(–4.357)	(0.977)	(8.565)
Observations	93	93	93	93	93	93	93	93	93	93	93	93
R–squared	0.680	0.950	0.569	0.671	0.710	0.725	0.564	0.726	0.612	0.629	0.618	0.832

Standard errors in parentheses, ***P<0.01, **P<0.05, *P<0.1

Medium technology–MT1

Variables	(1)	(2)	(3)	(4)	(5)
	rsca781	rsca782	rsca783	rsca784	rsca785
ROIL	0.04	–0.00	0.27***	0.33***	–0.44***
	(0.832)	(–0.012)	(2.602)	(4.118)	(–4.665)
RGDP	–1.01***	–2.41***	–0.53	–0.80	–1.98***
	(–3.073)	(–5.238)	(–0.799)	(–1.541)	(–3.236)
FDI	0.01	0.07**	–0.02	–0.00	0.14***
	(0.638)	(2.262)	(–0.395)	(–0.116)	(3.559)
CAPITAL	0.02	–0.19***	0.00	0.23***	–0.05
	(0.632)	(–3.717)	(0.058)	(4.107)	(–0.804)
MANV	1.15***	1.73***	–0.05	0.45	0.43
	(3.439)	(3.686)	(–0.076)	(0.859)	(0.691)
LABOR	–0.05	0.46***	0.01	–0.14	0.36**
	(–0.658)	(4.424)	(0.050)	(–1.203)	(2.558)
OILDD	–0.14	0.95***	0.22	–0.29	0.88***
	(—0.968)	(4.605)	(0.726)	(-1.251)	(3.218)
OPEN	0.02	–0.01	–0.09	0.37***	–0.18***
	(0.820)	(–0.287)	(–1.644)	(8.118)	(–3.464)
Constant	–2.44	8.78**	12.05**	4.29	29.66***
	(–0.893)	(2.297)	(2.192)	(0.998)	(5.831)
Observations	93	93	93	93	93
R–squared	0.418	0.820	0.185	0.618	0.625

Standard errors in parentheses, ***P<0.01, **P<0.05, *P<0.1

Medium Technology–MT3

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	rsca711	rsca713	rsca714	rsca721	rsca722	rsca723	rsca724	rsca725	rsca726	rsca727	rsca728	rsca737	rsca741	rsca742	rsca743
ROIL	0.00	–0.73***	0.34***	–0.85**	–0.05	–0.23**	–0.49***	–0.22**	–0.45**	–0.72***	–0.64**	–0.68**	–0.68**	–0.60**	–0.73**
	(0.032)	(–4.978)	(3.086)	(–5.34)	(–0.595)	(–4.217)	(–3.005)	(–2.095)	(–4.424)	(–4.848)	(–5.078)	(–5.029)	(–5.807)	(–3.814)	(–5.982)
RGDP	–0.41	–1.11	–2.03***	–0.59	–0.47	0.83**	–1.83*	–1.59**	–0.80	–1.30	1.08	–0.81	–1.95**	–0.83	–1.34*
	(–0.653)	(–1.164)	(–2.843)	(–0.563)	(–0.960)	(2.366)	(–1.736)	(–2.282)	(–1.195)	(–1.347)	(1.315)	(–0.925)	(–2.584)	(–0.815)	(–1.694)
FDI	–0.07	0.23***	–0.02	0.21***	0.03	0.05**	0.29***	0.10**	0.01	0.23***	0.17***	0.24***	0.18***	0.29***	0.19***
	(–1.624)	(3.673)	(–0.496)	(3.037)	(1.004)	(2.300)	(4.185)	(2.245)	(0.145)	(3.597)	(3.082)	(4.258)	(3.659)	(4.407)	(3.734)
CAPITAL	0.10	–0.16	0.12	0.04	–0.17***	0.07*	–0.06	0.18**	0.04	–0.12	–0.07	–0.00	–0.15*	–0.09	–0.05
	(1.406)	(–1.586)	(1.499)	(0.327)	(–3.182)	(1.879)	(–0.503)	(2.436)	(0.519)	(–1.136)	(–0.810)	(–0.028)	(–1.802)	(–0.844)	(–0.567)
MANV	0.84	–0.47	1.21*	–0.10	–0.34	–1.00***	–0.20	0.94	0.97	–0.15	–1.44*	–0.01	1.34*	–1.32	0.67
	(1.306)	(–0.485)	(1.660)	(–0.091)	(–0.670)	(–2.801)	(–0.185)	(1.323)	(1.422)	(–0.154)	(–1.720)	(–0.010)	(1.734)	(–1.278)	(0.835)
LABOR	–0.20	0.50**	–0.25	0.06	0.39***	–0.28***	0.37	–0.28*	–0.29*	0.39*	0.11	0.05	0.32*	0.52**	0.17
	(–1.382)	(2.293)	(–1.506)	(0.234)	(3.509)	(–3.518)	(1.563)	(–1.735)	(–1.939)	(1.777)	(0.595)	(0.250)	(1.881)	(2.260)	(0.924)
OILDD	–0.41	1.16***	0.14	0.07	0.88***	0.53***	1.03**	–0.30	–0.26	0.42	0.33	0.31	0.12	1.17**	0.44
	(–1.447)	(2.717)	(0.426)	(0.159)	(3.989)	(3.404)	(2.189)	(–0.955)	(–0.854)	(0.975)	(0.901)	(0.799)	(0.345)	(2.569)	(1.251)
OPEN	0.05	–0.22***	0.06	–0.09	–0.13***	0.09***	–0.16*	0.00	–0.07	–0.30***	–0.04	–0.08	–0.16**	–0.18**	–0.10
	(0.982)	(–2.678)	(0.967)	(–1.039)	(–2.989)	(2.964)	(–1.707)	(0.048)	(–1.233)	(–3.561)	(–0.578)	(–0.986)	(–2.356)	(–2.034)	(–1.456)
Constant	–5.77	27.20***	20.87***	13.60	11.88***	1.37	36.30***	17.41***	3.96	29.99***	4.14	15.56**	14.81**	36.05***	12.57*
	(–1.108)	(3.429)	(3.518)	(1.577)	(2.902)	(0.474)	(4.158)	(3.007)	(0.717)	(3.732)	(0.609)	(2.136)	(2.362)	(4.284)	(1.915)
Observations	93	93	93	93	93	93	93	93	93	93	93	93	93	93	93
R–squared	0.131	0.535	0.313	0.477	0.301	0.868	0.536	0.469	0.507	0.566	0.540	0.575	0.598	0.585	0.543

Standard errors in parentheses, ***P<0.01, **P<0.05, *P<0.1