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Impak Globalisasi terhadap Produktiviti Faktor Keseluruhan (TFP) Sektor Perkhidmatan di Malaysia

(Globalisation Impact towards Overall Productivity Factor (TFP) Service Sector in Malaysia)

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ABSTRAK

Sektor perkhidmatan di Malaysia telah dikenal pasti sebagai salah satu sektor utama untuk menggerakkan negara ke arah ekonomi berpendapatan tinggi. Sepertimana yang telah digariskan dalam Rancangan Malaysia Kesepuluh (RMKe-10), sektor perkhidmatan dilihat sebagai bidang baru yang dapat memacu ekonomi Malaysia supaya dapat bersaing dengan negara-negara membangun serta dapat meningkatkan martabat negara dan seterusnya dapat mencapai misi Wawasan 2020. Walau bagaimanapun, globalisasi dilihat sebagai salah satu cabaran besar untuk mengangkat martabat sektor ini dalam menerajui ekonomi negara. Globalisasi memainkan peranan penting serta memberi impak dalam sektor perkhidmatan sama ada secara langsung mahupun tidak langsung. Proses globalisasi seperti penyertaan buruh asing, perdagangan antarabangsa, pelaburan langsung asing dan sebagainya dikatakan akan mempengaruhi produktiviti faktor keseluruhan (TFP) sektor perkhidmatan. Objektif utama artikel ini adalah untuk menganalisis kesan globalisasi terhadap TFP sektor perkhidmatan di Malaysia. Analisis dalam artikel ini akan menggunakan Ujian Panel Statik dan juga Ujian Panel Dinamik. Hasil analisis menunjukkan bahawa globalisasi amat memberi pengaruh kepada TFP sektor perkhidmatan di Malaysia. Hasil selanjutnya menunjukkan semua pemboleh ubah iaitu pelaburan langsung asing (FDI), keterbukaan ekonomi (OPN) dan teknologi (TEC) mempunyai hubungan yang signifikan dalam jangka masa panjang.

Kata kunci: Globalisasi; Produktiviti Faktor Keseluruhan; sektor perkhidmatan

ABSTRACT

The service sector in Malaysia has been identified as one of the key sectors to move the country towards high-income economies. In the Tenth Malaysia Plan, the service sector is seen as new catalyst for Malaysian economic growth that subsequently make it more competitive. Hence, the vision of 2020 Nations status will be achieve. So that Malaysia can compete with other developing countries and increasing nation's status and consequently can achieve a national mission Vision 2020. However, issue of globalization in influencing this sector perceived as either big challenge to raise this sector status in lead national economy. Globalization played an important part and give impact in services sector either directly or indirectly. Globalization process such as foreign labor participation, trade and so on will be affecting on services sector through TFP services sector. The main objective in this study is to identify globalization effect on TFP services sector in Malaysia. This study will use Panel Static Test and Panel Dynamic Test by using MG and PMG Test. Results had showed globalization very giving influence to TFP in services sector in Malaysia and find all variable having significant relationship in long run.

Keywords: Globalisation; Overall Productivity Factor; service sector

PENGENALAN

Dunia kini menjadi lebih kompleks, dinamik dan berlakunya peningkatan ketidakpastian. Proses globalisasi yang berlaku dengan cepatnya telah mendorong kepada perubahan pesat dalam teknologi komunikasi serta informasi khususnya. Keadaan ini menyebabkan ekonomi menjadi lebih saling bergantung. Proses globalisasi ini juga telah membawa kepada peningkatan kecekapan

dalam produktiviti, melalui penggunaan teknologi yang lebih canggih. Bagi negara membangun, pengaliran masuk modal, teknologi baru dan kemahiran pengurusan yang baik dari negara lain akan turut mempengaruhi proses pembangunan ekonomi negara tersebut. Malaysia yang mengamalkan ekonomi terbuka dengan pasaran domestik yang kecil juga turut memperoleh faedah daripada proses globalisasi ini dan tidak terkecuali menerima pelbagai kesan daripada proses globalisasi ini.

Proses globalisasi membawa manfaat dan juga permasalahan baru bagi negara dan masyarakat, khususnya di negara membangun. Selain itu, pemodenan dan globalisasi telah mencetuskan pelbagai isu dan cabaran baru kepada sesebuah negara. Manakala di sudut yang lain pula, proses globalisasi juga telah mencetuskan cabaran yang tidak menentu ke atas anggota masyarakat, agen-agen serta aktor-aktor dalam ekonomi itu sendiri. Sesebuah negara mestilah bersedia untuk menerima arus perubahan globalisasi ini agar tidak ketinggalan serta sejajar dengan perkembangan ekonomi dunia.

Sektor perkhidmatan juga tidak terkecuali dalam menerima impak globalisasi ini. Sejak kebelakangan ini, sektor perkhidmatan telah menerima pelbagai perubahan dan transformasi pengembangan serta kemajuan dalam meningkatkan lagi keupayaan sektor ini seterusnya dapat meningkatkan pertumbuhan ekonomi negara Malaysia. Kesan globalisasi dalam sesebuah sektor boleh dilihat melalui produktiviti faktor keseluruhan (TFP) sektor tersebut. Keadaan ini disebabkan kebiasaannya globalisasi akan memberi kesan secara langsung mahupun tidak langsung terhadap TFP dalam sesebuah sektor. Dalam ekonomi, TFP merujuk kepada pemboleh ubah bukan input yang akan menyumbang kepada jumlah output.

Pada masa kini, kerajaan Malaysia memberikan perhatian yang lebih meluas dalam sektor perkhidmatan yang dahulunya dikategorikan sebagai sektor ketiga terpenting. Kenyataan ini telah dibuat oleh perdana menteri Malaysia kita sendiri, iaitu Yang Berbahagia Datuk Seri Najib Tun Razak dalam Rancangan Malaysia Kesepuluh (RMKE-10) serta dalam pembentangan bajet 2011. Beliau telah menyatakan salah satu usaha kerajaan yang mendapat perhatian meluas dalam RMKE-10 ialah untuk mewujudkan ekonomi diteraju oleh sektor swasta di mana hasrat kerajaan adalah untuk meliberalisasi sektor perkhidmatan. Dalam laporan RMKE-10 menyatakan bahawa membangunkan sektor perkhidmatan yang moden, dinamik dan berorientasi terbuka bagi membolehkannya menjadi pemangkin utama pertumbuhan ekonomi negara. Dalam tempoh Rancangan Malaysia Kesembilan (RMKe-9), walaupun kadar pertumbuhan guna tenaga adalah lebih perlahan iaitu 1.6 peratus setahun, namun sebanyak 0.9 juta pekerjaan telah diwujudkan, terutamanya dalam sektor perkhidmatan. (Malaysia 2011)

Kesedaran betapa pentingnya sektor perkhidmatan dari segi potensi sumbangannya kepada KDNK dan pertumbuhan KDNK serta jangkaan untuk menyumbang dalam peratusan yang besar dalam perbelanjaan pengguna, maka sektor ini perlu diliberalisasikan lagi bagi meningkatkan pertumbuhan ekonomi negara. Selain itu, sektor ini juga perlulah meningkatkan produktiviti TFP kerana dengan adanya TFP yang baik dan lebih cekap akan dapat merealisasikan hasrat negara dalam membangunkan sektor perkhidmatan khususnya. Sektor perkhidmatan yang semakin berkembang ini juga dilihat sebagai alat bidang baru yang dapat memacu ekonomi

negara supaya dapat bersaing dengan negara-negara membangun seterusnya dapat meningkatkan martabat negara dalam mencapai misi negara maju Wawasan 2020. Bagi mencapai hasrat murni ini, beberapa rintangan dan kekangan yang bakal ataupun sedang dihadapi mestilah dapat diatasi terutamanya proses globalisasi yang sentiasa berlaku dari semasa ke semasa. Negara Malaysia mestilah bersedia menerima kemasukan baru serta cabaran hebat yang diberikan melalui proses globalisasi ini kerana proses globalisasi ini sangat berkait rapat dengan sektor perkhidmatan dan memberi kesan terhadap TFP. Di antara cabaran hebat kesan globalisasi ini termasuklah seperti buruh asing dan pelaburan langsung asing. Selain itu, pemindahan teknologi atau peralatan baru serta teknologi baru yang dibawa masuk dari negara luar juga merupakan salah satu kesan daripada proses penglobalisasian dunia dan akan memberi kesan terhadap sektor-sektor di negara tertentu. Oleh yang demikian, negara perlulah bersedia menepis segala cabaran ini dan impak positif kesan dari penglobalisasian mestilah diimplementasikan dalam sektor perkhidmatan bagi memajukan lagi sektor ini. Selain daripada itu juga, keterbukaan ekonomi juga merupakan salah satu alat globalisasi yang terpenting dalam mempengaruhi ekonomi di sesebuah negara.

Usaha kerajaan untuk meningkatkan sektor perkhidmatan sebagai penjana utama ekonomi negara terpaksa berhadapan dengan proses globalisasi yang berterusan dari semasa ke semasa. Bagi menaiktaraf ekonomi negara sejajar dengan ekonomi negara-negara maju yang lain, kita perlulah melangkah seiring serta dapat mengatasi segala kekangan yang wujud daripada proses globalisasi tersebut. Oleh yang demikian, di sini dapat dilihat bahawa untuk meningkatkan sektor perkhidmatan ini, cabaran utama yang perlu diatasi ialah proses globalisasi. Maka, kajian ini dibuat berdasarkan pemasalahan kajian iaitu sejauh mana globalisasi memberi impak terhadap TFP sektor perkhidmatan. Indikator globalisasi seperti pelaburan langsung asing (FDI), pemindahan teknologi dan keterbukaan ekonomi akan dilihat dan kesannya terhadap TFP sektor perkhidmatan serta sejauh mana penentu indikator globalisasi tersebut dapat mempengaruhi pertumbuhan ekonomi Malaysia.

Secara keseluruhannya objektif artikel ini adalah untuk mengenal pasti kesan globalisasi terhadap TFP sektor perkhidmatan di negara Malaysia.

LITERATUR

Menurut Kartz (1969) dalam Idris (2007) TFP bukan sahaja bermaksud pembaikan teknologi, tetapi juga peningkatan kualiti input kerana faktor lain seperti pembangunan dan juga pengurusan sumber manusia. Menurutnyanya lagi, ramai penyelidik berpendapat bahawa TFP sebagai sumbangan kemajuan teknologi. Selain itu, TFP merujuk kepada keluaran tambahan yang dihasilkan daripada pembaikan dalam kaedah pengeluaran tanpa

perubahan dalam input buruh dan modal. TFP juga termasuklah peningkatan teknologi dan pengetahuan inovasi, teknik pengurusan yang lebih baik, faedah daripada pengkhususan, peningkatan kecekapan serta pendidikan, kemahiran dan pengalaman pekerja.

Jens J. Kruger (2001) telah menggunakan indeks Malmquist bagi mengkaji impak globalisasi terhadap TFP antara 87 negara bagi tahun 1960 hingga 1990. Hasil kajiannya telah mendapati bahawa trend globalisasi telah menyebabkan berlakunya perubahan dalam produktiviti semasa tahun 1960 hingga tahun 1990. Selanjutnya, beliau mendapati perpindahan modal daripada kesan global memberikan kesan yang besar antara kumpulan negara yang dikaji. Apabila proses globalisasi semakin rancak, didapati perubahan kecekapan dalam teknologi turut meningkat dan seterusnya TFP sesebuah negara juga meningkat.

Pelaburan langsung asing (FDI) merupakan salah satu faktor berlakunya perpindahan teknologi di kebanyakan negara membangun Findlay (1978) menyatakan FDI boleh meningkatkan produktiviti negara tuan rumah dengan mempunyai teknik pengurusan yang lebih maju dan teknologi dari firma asing dapat disebar kepada syarikat tempatan. Syarikat multinasional kebiasaannya menggunakan teknologi paling maju dan terkini dan berlaku perpindahan teknologi. Walau bagaimanapun, berdasarkan kajian di negara membangun, Van Pottelsberghe dan Lichtenberg (2001) mendapati bahawa pemindahan teknologi melalui FDI hanya mungkin berlaku sekiranya negara tempat mereka melabur, melakukan ataupun terlibat dalam aktiviti penyelidikan dan pembangunan (P&P). Namun, perkara ini jarang berlaku, malah motif firma asing melabur di luar negara adalah lebih kepada mengeksploitasi kelebihan teknologi mereka berbanding untuk menyebarkan teknologi mereka.

Songqing Jing et al. (2002) menerangkan dalam kajian mereka untuk membina rangka kerja bagi melihat trend pelaburan domestik dan antarabangsa dalam penyelidikan pertanian dan mengukur kesannya terhadap TFP. Sumbangan utama metodologi adalah untuk menyediakan ukuran yang lebih baik dan langkah-langkah yang khusus bagi teknologi tanaman daripada program penyelidikan negara China dan daripada pengimport sistem penyelidikan pertanian antarabangsa. Hasil kajian mereka telah mendapati bahawa dari 1980 hingga 1995, TFP negara China bagi pengeluaran beras, gandum dan jagung telah meningkat dengan cepat akibat daripada pertumbuhan teknologi baru. Keadaan ini menunjukkan bahawa di negara China, apabila teknologi meningkat dan semakin canggih, maka TFP sektor pertanian juga turut meningkat.

Sangho Kim dan Hyunjoon Lim (2007) mengkaji hubungan di antara perdagangan dan pertumbuhan TFP di Korea dari tahun 1980 hingga tahun 2003. Kajian empirikal telah menunjukkan bahawa wujudnya hubungan penyebab Granger daripada import terhadap

pertumbuhan TFP dan kehadiran hubungan sebab akibat bagi mana-mana eksport dan TFP. Berdasarkan hubungan sebab penyebab di antara import dan pertumbuhan TFP, pertumbuhan TFP dianalisis menggunakan pelbagai pemboleh ubah perdagangan bersama-sama dengan pelaburan P&P dan juga saiz kerajaan. Hasil kajian menunjukkan import mempunyai kesan positif dan sangat penting kepada TFP berbanding dengan eksport. Selain daripada itu, hasil kajian juga menunjukkan bahawa kesan bermanfaat import terhadap pertumbuhan TFP bukan sahaja akibat daripada tekanan kompetitif dan pengetahuan baru yang diperoleh daripada persaingan asing dalam konteks peningkatan import barang akhir tetapi juga daripada pemindahan teknologi yang dibawa dan diimport dari negara maju.

METODOLOGI DAN SPESIFIKASI MODEL

Analisis dalam artikel ini menggunakan data panel yang menggabungkan kedua-dua data, iaitu data keratan rentas dan data siri masa. Data yang dikumpul dan digunakan dalam kajian ini adalah data siri masa sekunder yang meliputi tempoh 25 tahun bermula dari 1983 hingga 2007. Kajian ini meliputi 19 sub-sektor perkhidmatan yang dipilih dan dapat dilihat pada Lampiran 1 di halaman 11. Sub-sektor perkhidmatan yang dipilih adalah berdasarkan bidang keutamaan seperti mana yang telah dibentangkan dalam bajet 2011. Data asas dalam kajian ini diperoleh daripada Laporan Penyiasatan Industri Sektor Perkhidmatan yang diperoleh daripada Jabatan Perangkaan Malaysia (JPM). Selain itu, data lain yang turut digunakan diperoleh daripada Kementerian Perdagangan Antarabangsa dan Industri (MITI) dan Lembaga Kemajuan Perindustrian Malaysia (MIDA). Penganggaran model dibuat dengan menggunakan fungsi pengeluaran Cobb-Douglas. Data kemudiannya dianalisis menggunakan perisian Stata 10 dan juga *E-views 7*. Kajian ini menggunakan kaedah data panel dinamik yang menggabungkan data siri masa dan keratan rentas dimana keratan rentas adalah lebih besar dari siri masa iaitu $N > T$. Analisis adalah merangkumi pendekatan kesan tetap (*Fixed Effect*) dan pendekatan kesan rawak (*Random Effect*). Pendekatan yang digunakan dalam menganalisis data ialah regresi *Pooled Mean Group* (PMG), *Mean Group* (MG) dan ujian Hausman. Ujian PMG dan MG dilihat bagi melihat kesan jangka panjang dan kesan jangka pendek pemboleh ubah yang terlibat dalam kajian ini.

PENGANGGARAN TFP

Pengukuran TFP adalah berkaitan dengan spesifikasi dan penganggaran fungsi pengeluaran. Model yang digunakan dalam kajian ini menganggarkan TFP berdasarkan kerangka pertumbuhan perakaunan yang dipelopori oleh Solow (1957). TFP adalah *residual* dan dianggap

mewakili perubahan teknologi. TFP merupakan kecekapan ekonomi dan teknikal dengan sumber seperti modal dan buruh ditukar kepada keluaran. Berdasarkan rangka kerja ini, secara matematikanya, fungsi pertumbuhan output berbentuk Cobb-Douglas yang digunakan dalam kajian ini boleh ditulis sebagai:

$$Y = AK^\alpha L^{1-\alpha} \quad (1)$$

Kemudian persamaan (1) boleh dinyatakan dalam bentuk log-linear seperti berikut:

$$\ln Y = \ln A + \alpha \ln K + (1 - \alpha) \ln L + \mu \quad (2)$$

Di mana, Y = nilai output benar (RM), K = nilai modal benar (RM), L = bilangan guna tenaga (orang), α = parameter bagi modal, $1 - \alpha$ = parameter bagi buruh, dan μ = sebutan rawak.

Nilai TFP boleh dihitung dengan menggunakan kaedah residual berdasarkan daripada persamaan (2) iaitu:

$$TFP = \text{pertumbuhan output} - [(\alpha)(\text{purata pertumbuhan buruh})] - [(1 - \alpha)(\text{purata pertumbuhan modal}] \quad (3)$$

Di mana, pertumbuhan output = nilai output sektor perkhidmatan ataupun hasil (Y), α = nilai koefisien bagi modal dan $1 - \alpha$ = nilai koefisien bagi buruh.

Setelah nilai TFP dihitung, maka analisis model perlu dilakukan. Bagi penganggaran model TFP sektor perkhidmatan, pemboleh ubah bersandar adalah TFP sektor perkhidmatan manakala pemboleh ubah tidak bersandar yang digunakan adalah nilai FDI, keterbukaan ekonomi (OPN), jumlah perjanjian pemindahan teknologi (TEC) dalam sektor perkhidmatan dan jumlah buruh (L) serta nisbah modal- buruh (K/L).

SPESIFIKASI MODEL

Analisis dalam artikel menggunakan data panel dalam menganggarkan model TFP. Data panel digunakan kerana ia dapat mengawal bias pemboleh ubah, memberi banyak maklumat mengenai data dan mengurangkan kesan multikolineariti serta penganggaran pekali yang tepat (Hsiao 2003 dan Munoz 2006). Di samping itu, analisis data panel juga membenarkan spesifikasi dinamik. Spesifikasi model dibentuk berdasarkan kajian-kajian lepas. Kajian-kajian lepas menunjukkan pemboleh ubah FDI, OPN dan TEC sebagai penyumbang penting (Findlay 1978, Songqing Jing et al. 2002).

Maka, dalam kajian ini indikator globalisasi yang digunakan adalah FDI, OPN dan juga TEC bagi melihat kesan globalisasi sektor perkhidmatan di Malaysia. Model yang digunakan dalam kajian ini untuk melihat impak globalisasi terhadap TFP sektor perkhidmatan di Malaysia ialah:

$$\ln TFP_i = \alpha_0 + \alpha_1 \ln \frac{K}{L} + \alpha_2 \ln FDI + \alpha_3 \ln OPN + \alpha_4 \ln TEC + \ln L + \varepsilon_{it} \quad (4)$$

Dengan TFP_i = TFP sektor perkhidmatan terpilih, K/L = nisbah modal-buruh dalam sektor perkhidmatan terpilih. Intensiti modal iaitu nilai aset yang dimiliki oleh sektor perkhidmatan dibahagikan kepada jumlah buruh dalam sektor tersebut. FDI = nilai FDI benar dalam sektor perkhidmatan. OPN = keterbukaan ekonomi benar. Di mana ia, merupakan darjah keterbukaan ekonomi benar. Darjah keterbukaan ekonomi diperolehi daripada jumlah eksport benar (E) ditambah dengan jumlah import benar (M) dan dibahagikan dengan nilai KDNK benar. Iaitu boleh ditulis sebagai: $[(E+M)/KDNK \text{ benar}]$. TEC = teknologi iaitu jumlah perjanjian teknologi agregat yang diukur dari segi bilangan yang dibuat di antara pelabur asing dengan pihak kerajaan. L = bilangan buruh dalam sektor perkhidmatan dan ε_{it} = ralat. Manakala, \ln = logaritma asli.

KAEDAH ANALISIS DATA

Analisis data panel static Terdapat tiga analisis data panel iaitu penganggar pekali malar, penganggar kesan tetap dan penganggar kesan rawak. Model penganggar pekali malar adalah berkaitan dengan penganggaran menggunakan *Ordinary Least Squares* (OLS). Manakala bagi model penganggaran kesan tetap berkaitan dengan *Least Square Dummy Variable Model* (LSDV) iaitu merujuk kepada model yang mempunyai kecerunan yang malar tetapi pemalar berdasarkan unit keratan rentas. Model penganggaran kesan rawak pula berkait dengan model regresi dengan ralat unit keratan rentas yang tidak berhubungan dengan ralat pemboleh ubah yang digunakan dalam model.

Kajian ini mempunyai nilai keratan rentas sebanyak 19 sub-sektor perkhidmatan yang terpilih dan jumlah ini adalah lebih besar berbanding jumlah regresor iaitu sebanyak enam pemboleh ubah. Oleh yang demikian, kajian ini akan mengambil kira penganggar kesan rawak kerana memenuhi syarat umum yang dikehendaki, iaitu jumlah regresor mestilah lebih kecil daripada jumlah keratan rentas sekiranya ujian kesan rawak hendak dijalankan. Maka, analisis yang akan dijalankan ke atas penganggar pekali malar, penganggar kesan tetap dan juga penganggar kesan rawak bagi menguji kepadanan pemboleh ubah dalam model.

Pengujian hipotesis dilakukan untuk mengenalpasti penganggar yang terbaik bagi menganggarkan model. Dalam menentukan sama ada model penganggaran pekali malar atau penganggaran kesan tetap menunjukkan model yang lebih baik, maka pengujian hipotesis dilakukan dengan menggunakan ujian ujian F-Wald. Bentuk hipotesis ujian adalah seperti berikut:

$$H_0 = \text{penganggaran pekali malar} \\ H_1 = \text{penganggaran kesan tetap}$$

Jika F-statistik lebih besar daripada F-kritikal, maka hipotesis nul ditolak menunjukkan bahawa model penganggaran kesan tetap adalah lebih. Keadaan

sebaliknya, jika F-statistik lebih kecil daripada F-kritikal, maka hipotesis nul tidak ditolak dan ini menunjukkan bahawa model penganggar pekali malar lebih baik daripada model penganggar kesan tetap. Selanjutnya bagi menentukan ujian sama ada model kesan tetap atau kesan rawak adalah lebih baik, maka ujian Hausman. Di mana bentuk hipotesis ujian adalah seperti berikut:

- H_0 = mengikut kesan rawak
- H_1 = mengikut kesan tetap

Sekiranya hasil penganggaran adalah signifikan iaitu nilai P kurang daripada 5%, sehingga H_0 . Oleh itu, model mengikut kesan tetap adalah lebih baik dan begitu juga sebaliknya.

Analisis data panel dinamik Teknik data panel statik yang berdasarkan sama ada kesan malar, kesan tetap ataupun kesan rawak tidak mampu menyelaraskan keheterogenandinamik dalam keseimbangan hubungan jangka panjang (Pesaran dan Smith 1995; Pesaran et al. 1999). Oleh yang demikian, dalam analisis ini penganggaran akan dilanjutkan lagi dengan menggunakan data panel dinamik yang terdiri daripada dua model penganggaran iaitu penganggaran *mean group* (mg) dan *pooled mean group* (PMG).

Parameter jangka panjang adalah lebih konsisten apabila dianggarkan menggunakan pendekatan *autoregressive distributed lag* (ARDL) (Pesaran dan Shin 1999). Selain itu, seperti yang didapati oleh Pesaran, Shin dan Smith (1999) pendekatan ini adalah konsisten dan normal *asymptotically* dalam menghasilkan penganggar pekali jangka panjang tidak kira sama ada regressor asas I (1) atau I (0). Oleh itu, anggaran *Mean group* (MG) dan *Pooled Mean Group* (PMG) dijalankan dalam kajian. Kaedah ini amat sesuai untuk analisis data panel dengan tempoh masa dan dimensi keratan rentas yang besar.

Penganggaran Pooled Mean Group (PMG) PMG berdasarkan model ARDL mempunyai kelebihan untuk menentukan hubungan jangka panjang dan jangka pendek yang dinamik. Analisis panel pada pembetulan ralat tanpa had ARDL (Pesaran et al. 1999):

$$\Delta y_{it} = \phi_i y_{i,t-1} + \beta_i' x_{i,t-1} + \sum_{j=1}^{p-1} \lambda_{ij} \Delta y_{i,t-j} + \sum_{j=0}^{q-1} \gamma_{ij}' \Delta x_{i,t-j} + \mu_i + u_{it} \quad (5)$$

$i = 1, 2, \dots; t = 1, 2, \dots, T$

Dengan, y_{it} adalah pemboleh ubah bersandar, x_{it} ialah $k \times 1$ vektor regresor bagi kumpulan i , μ_i mewakili kesan tetap, ϕ_i ialah pekali skalar pada pemboleh ubah bersandar *lagged*, β_i adalah $1 \times k$ pekali vektor pada pemboleh penerang, λ_{ij} adalah pekali skalar pada pemboleh ubah bersandar pada pembezaan pertama, dan γ_{ij} adalah

$k \times 1$ pekali vektor pada pemboleh ubah penerang pada pembezaan pertama dan nilai tertangguh.

Gangguan dalam model ARDL adalah dianggap tidak bergantung pada semua i dan t , dengan min adalah sifar dan varian melebihi sifar. $\phi_i < 0$ untuk semua i , oleh itu wujud hubungan jangka panjang antara y_{it} dan x_{it} ditakrifkan oleh:

$$y_{it} = \theta_i' x_{it} + \eta_{it} \quad (6)$$

$i = 1, 2, \dots; t = 1, 2, \dots, T$

dengan vektor $k \times 1$ adalah pekali jangka panjang, dan η_{it} adalah pegun dengan kemungkinan min bukan sifar (termasuk kesan tetap).

Persamaan (5) boleh ditulis semula sebagai,

$$\Delta y_{it} = \phi_i \eta_{i,t-1} + \sum_{j=1}^{p-1} \lambda_{ij} \Delta y_{i,t-j} + \sum_{j=0}^{q-1} \gamma_{ij}' \Delta x_{i,t-j} + \mu_i + u_{it} \quad (7)$$

Dengan $\eta_{i,t-1}$ adalah pembetulan ralat dalam (2), ϕ_i ialah pekali pembetulan ralat yang mengukur kelajuan pelarasan ke arah keseimbangan jangka panjang.

Di bawah rangka kerja umum ini, Pesaran et al. (1999) mencadangkan penganggar PMG. Pengukur PMG membolehkan intersep, pekali jangka pendek dan perbezaan ralat berbeza secara bebas pada semua kumpulan, tetapi pekali jangka panjang terkekang sama iaitu, $\theta_i = \theta$ untuk semua i . Kumpulan yang spesifik jangka pendek dan pekali-jangka panjang dikira oleh penganggar *pooled maximum likelihood*. Alasan untuk menjangkakan hubungan keseimbangan jangka panjang di antara pemboleh ubah yang sama di seluruh kumpulan adalah disebabkan kekangan bajet atau *solvency*, keadaan arbitraj, dan teknologi biasa mempengaruhi semua kumpulan dengan cara yang sama.

Penganggaran Model Mean Group (MG) Menurut Pesaran dan Smith (1995), prosedur kurang terhad membolehkan kepelbagaian semua parameter (mengenakan sebarang sekatan sempadan negara). Ia terdiri daripada menganggarkan penganggaran regresi yang berlainan untuk setiap negara dan mengumpul purata pekali spesifik negara. Kedua-dua penganggaran MG dan PMG memerlukan memilih panjang lag sesuai untuk persamaan negara secara individu; Schwarz Baysian Kriteria (SBC) / Maklumat Akaike Kriteria (AIC). Pengukur MG menyediakan anggaran min jangka panjang yang konsisten walaupun ini akan menjadi tidak cekap jika kehomogenan mencerun. Dalam kehomogenan mencerun jangka panjang, penganggar *pooled* adalah konsisten dan cekap.

Anggaran MG adalah bermakna tanpa wajaran daripada regresi koefisien N individu. Pilihan MG adalah melalui semua panel dalam sampel untuk menganggar parameter daripada persamaan (5). Anggaran MG dibentangkan sebagai model dua persamaan iaitu

vektor kointegrasi normal dan koefisien dinamik jangka pendek.

Ujian Hausman Ujian Hausman ataupun spesifikasi ujian Hausman merupakan ujian statistik ekonometrik yang dicipta Jerry A. Hausman. Ujian ini menilai kepentingan penganggar berbanding dengan penganggar alternatif (Hausman 1978). Kajian ini menggunakan Ujian Hausman untuk membezakan MG dan PMG yang jika di bawah hipotesis nol, perbezaan dalam pekali dianggarkan antara MG dan PMG tidak jauh berbeza dan PMG adalah lebih cekap. Ujian ini juga membantu menilai sekiranya model statistik adalah sepadan dengan data yang digunakan.

Hipotesis homogeniti parameter dasar jangka panjang tidak boleh dianggap sebagai utama, tetapi ia memerlukan diuji secara empirikal dalam semua spesifikasi. Kesan heterogeniti min pekali boleh ditentukan dengan ujian Hausman (Hausman 1978). Ujian Hausman digunakan untuk membezakan MG dan PMG yang jika:

b = konsisten di bawah hipotesis H_0 and H_a ;

B = tidak konsisten dibawah H_a , efisien di bawah H_0

HASIL KAJIAN

ANALISIS PENGANGGARAN UJIAN DATA PANEL STATIK KESAN MALAR, KESAN TETAP (*FIXED EFFECT*) DAN KESAN RAWAK (*RANDOM EFFECT*)

Pengujian hipotesis bagi pemilihan model yang terbaik menggunakan hasil analisis data panel dilakukan. Bagi memilih model terbaik, penganggaran model kesan malar, kesan tetap dan kesan rawak dijalankan. Ujian F –Wald digunakan bagi menguji model penganggar pekali malar dan model penganggar kesan tetap.

H_0 = penganggaran pakali malar

H_1 = penganggaran kesan tetap

Didapati, ujian F-Wald, menunjukkan model penganggar kesan tetap adalah lebih baik daripada model penganggar pekali malar. Ini ditunjukkan oleh nilai F-statistik lebih besar daripada nilai F-kritikal ($205.285 > 1.571$). Keputusan ujian dapat dilihat berdasarkan Jadual 1. Nilai R^2 penganggar kesan tetap juga lebih tinggi daripada R^2 penganggar pekali malar iaitu ($0.982 > 0.882$).

Seterusnya ujian Hausman perlu dilakukan di antara kesan tetap dan juga kesan rawak bagi memilih model yang terbaik. Di mana bentuk hipotesis ujian adalah seperti berikut:

H_0 = model mengikut kesan rawak

H_1 = model mengikut kesan tetap

Sekiranya hasil penganggaran adalah signifikan, iaitu nilai-p 1.000 adalah lebih besar daripada lima peratus,

JADUAL 1. Hasil Ujian Regresi Pekali Malar dan Kesan Tetap

Pemboleh ubah	Pekali Malar (<i>Pooled</i>)	Kesan Tetap (<i>Fixed Effects</i>)	Kesan Rawak (<i>Random Effect</i>)
Konstan	0.709 (1.689)*	0.750 (4.066)**	-199 (-8.188)**
Ln K/L	0.403 (15.067)**	0.409 (15.976)**	0.387 (12.387)**
Ln FDI	0.011 (0.252)	0.011 (0.714)	-0.011 (-0.684)
Ln TEC	0.135 (3.894)	0.137 (2.363)**	0.001 (0.617)
Ln OPN	0.005 (0.0014)**	0.005 (8.207)**	0.001 (2.389)**
Ln L	-0.073 (-3.385)**	-0.008 (-2.812)**	0.017 (29.282)**
R^2	0.472	0.933	0.882
Ujian F-Wald		H_0 ditolak	
Ujian Hausman		H_0 gagal ditolak	
F-Statistik		280.089	
F-Kritikal (F dalam jadual)		1.571	

** Signifikan pada aras keertian 5%

* Singnifikan pada aras keertian 10%

t-statistik adalah dalam kurungan ()

maka H_0 gagal ditolak. Oleh itu, model mengikut kesan rawak dipilih sebagai model yang terbaik. Keputusan yang dilihat adalah berdasarkan model penganggar kesan rawak kerana merupakan model terbaik dalam menerangkan kesan globalisasi terhadap TFP sektor perkhidmatan. Keputusan yang diperoleh menunjukkan hubungan yang signifikan di antara indikator-indikator globalisasi terhadap TFP sektor perkhidmatan kecuali bagi pemboleh ubah FDI dan TEC. Oleh yang demikian hubungan di antara FDI dan juga TEC memerlukan analisis yang lebih lanjut kerana data yang digunakan disini mempunyai dinamik kompleks dan disifatkan oleh trend yang kuat dan bukan kepegungan. Penganggar tradisional *Pooled* seperti Kesan Tetap dan Kesan Rawak tidak dapat mengenalpasti kesan masa dan setiap sub-sektor dalam jangka panjang atau jangka pendek dinamik. Oleh yang demikian, kaedah ini mungkin tidak sesuai dalam kes kajian ini. Teknik anggaran baru kini boleh didapati dalam kajian lepas yang membenarkan sebarang kesan untuk dikawal dan diukur. Parameter jangka panjang adalah lebih konsisten dianggarkan menggunakan

pendekatan *autoregressive distributed lag* (ARDL). Oleh itu, anggaran *Mean Group* (MG) dan *Pooled Mean Group* (PMG) dijalankan untuk analisis statistik data panel yang dinamik. Kaedah ini amat sesuai untuk menganalisis data panel dengan tempoh masa dan dimensi keratan rentas yang besar.

ANALISIS PENGANGGARAN UJIAN DATA PANEL DINAMIK
 POOLED MEAN GROUP (PMG) DAN MEAN GROUP (MG)

Penganggaran PMG telah dilakukan dan hasil menunjukkan bahawa hubungan jangka panjang mempunyai hubungan yang signifikan terhadap semua pemboleh ubah globalisasi terhadap TFP. Hasil keputusan boleh dilihat dalam Jadual 2 yang menunjukkan wujud hubungan jangka panjang di antara FDI, KL, L, TEC dan juga OPN berdasarkan kepada nilai $P > |z|$ di mana semua pemboleh ubah adalah signifikan sekurang-kurangnya pada aras keertian lima peratus. FDI menunjukkan hubungan yang signifikan secara positif terhadap pertumbuhan TFP sektor perkhidmatan di Malaysia kerana apabila FDI meningkat sebanyak satu peratus, maka TFP dalam sektor perkhidmatan akan meningkat sebanyak 0.07 peratus. Secara umumnya, peningkatan pertumbuhan TFP mempunyai kaitan peningkatan pelaburan. Peningkatan pelaburan yang besar khususnya pelaburan langsung asing telah menjadi saluran bagi teknologi baru memasuki proses pengeluaran.

Begitu juga dengan keterbukaan ekonomi ataupun OPN dan TEC memberikan keputusan yang signifikan dan berhubung dengan positif dengan pertumbuhan TFP sektor perkhidmatan di Malaysia dalam jangka panjang.

Manakala bagi intensiti modal, iaitu K/L, dan L pula menunjukkan hubungan yang signifikan secara positif terhadap pertumbuhan TFP dalam jangka panjang dan jangka pendek. Apabila satu peratus peningkatan dalam intensiti modal per buruh meningkat TFP sektor perkhidmatan meningkat sebanyak 0.91 peratus. Begitu juga dengan teknologi yang menunjukkan nilai koefisien yang positif serta signifikan pada aras keertian lima peratus. Keadaan ini juga mungkin disebabkan oleh daya saingan Malaysia yang mana negara telah diberi kedudukan yang tinggi dari segi tahap pelaburan dan kemampuan untuk menyebarkan, menyerap dan menggunakan teknologi yang diimport. Apabila teknologi meningkat sebanyak satu peratus, maka TFP sektor perkhidmatan turut meningkat sebanyak 13.01 peratus. Keadaan ini adalah benar menurut kajian lepas yang telah dibuat oleh Songqing Jing et al. (2002) menunjukkan di negara China apabila teknologi meningkat maka TFP sektor pertanian juga turut meningkat.

Bagi melihat hubungan jangka pendek pula, jadual yang sama boleh dirujuk dan didapati hanya pemboleh ubah globalisasi iaitu FDI sahaja yang menunjukkan hubungan yang signifikan. Manakala pemboleh ubah TEC dan OPN memberikan kesan yang tidak signifikan terhadap TFP sektor perkhidmatan dalam jangka masa pendek. Pemboleh ubah bukan globalisasi iaitu L dan intensiti K/L menunjukkan hubungan yang signifikan. Hubungan ini boleh dilihat melalui nilai $P > |z|$. Nilai P mestilah kurang daripada 0.05, iaitu pada aras keertian lima peratus. Manakala bagi ujian MG pula menunjukkan semua pemboleh ubah adalah tidak signifikan dan tidak berkolerasi terhadap pemboleh ubah TFP dalam jangka

JADUAL 2. Hasil Ujian PMG dan MG

	Penganggar <i>Pooled Mean Group</i> dan <i>Mean Group</i> (Pemboleh ubah bersandar: ΔTFP_{it})						$\chi^2(2)$	P
	Penganggar PMG			Penganggar MG				
	Koefisien	se	Nilai-p	Koefisien	se	Nilai-p		
ΔFDI_{it}								
Jangka panjang	0.066	0.039	0.086***	-0.249	0.189	0.188		
Jangka pendek	-0.000	0.000	0.099*	0.000	0.000	0.374		
ΔTEC_{it}								
Jangka panjang	13.082	6.243	0.036**	37.536	25.928	0.148		
Jangka pendek	-0.011	0.009	0.281	-0.002	0.015	0.870		
ΔOPN_{it}								
Jangka panjang	37.353	0.225	0.001***	8.051	85.273	0.925		
Jangka pendek	-0.000	0.029	0.696	0.000	0.000	0.907		
ΔL_{it}								
Jangka panjang	0.439	0.028	0.000***	131	0.639	0.925		
Jangka pendek	-0.140	0.042	0.081*	-0.151	0.110	0.170		
ΔKL_{it}								
Jangka panjang	0.557	0.166	0.001***	-0.763	0.729	0.296		
Jangka pendek	-0.000	0.000	0.000***	-0.000	0.000	0.047**		
				Ujian Hausman			0.42	0.995

Nota: ***/**/* signifikan pada aras keertian 1%, 5%, 10%,

masa panjang iaitu pemboleh ubah K/L, L, TEC, OPN dan FDI. Hubungan dalam jangka pendek juga memberikan hasil keputusan yang sama kecuali bagi pemboleh ubah intensiti modal memberikan hubungan yang signifikan tetapi negatif terhadap TFP. Pemboleh ubah FDI, OPN, TEC dan L adalah tidak signifikan dalam menerangkan TFP.

ANALISIS UJIAN HAUSMAN

Berdasarkan kepada ujian analisis Hausman yang telah dilakukan, hasil keputusan boleh dilihat dalam jadual 2. Keputusan pemilihan model antara PMG dan MG dibuat melalui ujian Hausman. Didapati Ujian Ho menunjukkan $\chi^2(4) = (b-B)'[(V_b - V_B)^{-1}](b-B) = 0.42$ dan $\text{Prob} > \chi^2 = 0.995$ pada aras keertian 0.05. Oleh yang demikian, dapat disimpulkan bahawa penganggar PMG adalah pengukur yang lebih efisien di bawah hipotesis nol, dan PMG adalah pilihan penganggaran model yang terbaik berbanding dengan MG.

KESIMPULAN DAN CADANGAN

Melalui hasil keputusan yang diperolehi daripada penganggaran model yang telah dilakukan, kesemua indikator globalisasi didapati memberi kesan yang signifikan terhadap TFP sektor perkhidmatan di Malaysia. Misalnya pelaburan langsung asing, teknologi dan keterbukaan ekonomi telah memberikan impak yang positif terhadap pertumbuhan TFP sektor perkhidmatan dalam jangka masa panjang. Keadaan ini adalah selari dengan matlamat kerajaan di mana pelaburan dijadikan sebagai alat untuk meningkatkan pertumbuhan ekonomi negara Malaysia.

Begitu juga dengan tahap keterbukaan ekonomi negara yang semakin tinggi turut menyebabkan TFP sektor perkhidmatan semakin meningkat dari semasa ke semasa. Malaysia misalnya adalah di antara negara yang mempunyai tahap keterbukaan ekonomi yang sederhana di dunia, kita tidak boleh menafikan bahawa kita perlu pelaburan asing. Kita perlu memperbaharui daya saing negara untuk membawa pelabur asing kembali ke negara kita, khususnya di sektor-sektor tambah-nilai yang tinggi. Selain daripada itu, kita perlu menyemak dan merombak kerangka dasar yang ada, institusi, prosedur dan proses yang menghalang pelaburan asing untuk membangunkan ekonomi. Pengaliran modal asing yang tinggi akan dapat meningkatkan pendapatan negara kita. Langkah seperti mana yang dilakukan oleh kerajaan Singapura, Hong Kong dan juga Amerika Syarikat dengan melihat dasar keterbukaan negara tersebut adalah lebih tinggi dapat meningkatkan lagi pertumbuhan ekonomi di negara mereka. Suasana pelaburan yang baik contohnya ialah kestabilan kadar pertukaran dan juga kadar bunga merupakan di antara faktor yang terpenting untuk menarik minat pelabur-pelabur asing. Oleh yang demikian kewujudan suasana pelaburan yang lebih

baik dan terbuka adalah penting untuk meningkatkan pendapatan, TFP serta pertumbuhan ekonomi di sesebuah negara. (Steven et al. 1997).

Manakala melalui hasil kajian ini juga FDI didapati memberikan hubungan yang negatif tetapi signifikan terhadap TFP sektor perkhidmatan di Malaysia dalam jangka masa pendek. Keadaan ini mungkin berlaku disebabkan dalam jangka masa pendek syarikat ataupun firma mengalami kejutan kemajuan yang telah dibawa masuk oleh pelabur asing dan memerlukan masa untuk menyesuaikan segala bentuk pelaburan ke dalam firma domestik. Penemuan kajian ini adalah selari dengan hasil dapatan yang telah diperolehi oleh Sailesh (2009) di mana, kajiannya mendapati FDI memberikan kesan yang negatif dalam jangka pendek akibat daripada kejutan kemajuan dan juga kejutan perubahan teknikal yang dialami oleh pelabur asing yang melabur di firma tempatan. Oleh yang demikian kesan positif FDI ke atas TFP hanya boleh dilihat dalam jangka masa panjang sahaja.

TEC dan juga OPN pula menunjukkan hubungan yang tidak signifikan terhadap TFP dalam jangka masa pendek. TEC dan OPN yang tidak signifikan dalam jangka masa pendek ini mungkin disebabkan oleh penerimaan teknologi baru memerlukan masa yang agak panjang untuk melihat kesannya terhadap produktiviti dan juga TFP sektor perkhidmatan di Malaysia. Kesan yang tidak signifikan ini juga telah diperolehi berdasarkan kajian lepas yang pernah dilakukan oleh Haddad et al. (1999) dan beliau menyatakan syarikat akan cenderung untuk mempelajari teknologi maju dengan menerima teknologi baru yang dibawa melalui kegiatan perdagangan. Tetapi untuk mempelajari teknologi baru yang dibawa dari syarikat asing ini akan memerlukan masa yang panjang untuk diadaptasi ke dalam syarikat tempatan ataupun domestik.

Secara keseluruhannya kajian ini dapat disimpulkan bahawa indikator globalisasi seperti FDI, keterbukaan ekonomi dan juga perpindahan teknologi mendatangkan kesan kepada TFP sektor perkhidmatan dan mempunyai hubungan yang signifikan sama ada memberi kesan negatif mahupun positif. Berdasarkan hasil penganggaran regresi pada persamaan panel data dinamik, kesemua pemboleh ubah globalisasi iaitu FDI, OPN dan TEC adalah signifikan dalam menerangkan perubahan TFP. Oleh yang demikian, dalam era globalisasi dan liberalisasi kini, sektor perkhidmatan perlu meningkatkan daya saingnya menerusi perubahan teknologi dan kecekapan tenaga kerja supaya mempunyai lebih kemampuan untuk menembusi pasaran antarabangsa dan akhirnya menjana keuntungan yang lebih besar. Kemahiran buruh misalnya amatlah penting dalam menyesuaikan teknologi baru dan ini boleh diperolehi melalui latihan pekerja untuk meningkatkan kemahiran. Penggunaan modal yang cekap pula boleh dikaitkan dengan Penyelidikan dan Pembangunan (P&P) dalam mendapatkan teknologi yang sesuai. Dalam hal ini, peruntukan P&P perlu ditekankan

demikian membangunkan teknologi baru yang lebih sesuai dengan keperluan industri. Oleh itu dapat disimpulkan bahawa globalisasi memberikan impak yang pelbagai terhadap TFP dalam sektor perkhidmatan Malaysia.

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LAMPIRAN

LAMPIRAN I. Senarai sub-sektor Perkhidmatan Terpilih

Sub-sektor	Sub-sektor terpilih
1	Peguam
2	Akauntan
3	Arkitek
4	Pelukis pelan bangunan
5	Jurutera
6	Juruukur
7	Sekolah persendirian
8	Perkhidmatan perubatan
9	Perkhidmatan pergigian
10	Veterinar
11	Hospital dan rumah bersalin persendirian
12	Perkhidmatan broker stok, saham, komoditi dan tukaran wang asing
13	Ejen hartanah
14	Perkhidmatan penayangan wayang gambar,
15	Pengangkutan bas,
16	Pengangkutan muatan,
17	Agensi pengiklanan
18	Penginapan
19	Perkhidmatan agensi pengembaraan dan perator pelancongan

Crime and Its Socio-Macroeconomics Determinants: A Panel-Error-Correction Cointegration Analysis

(Jenayah dan Penentu Ekonomi Sosio-Makro: Kointegrasi Pembetulan Ralat Panel)

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ABSTRACT

This study investigates the relationship between crime and socio and macro economic variables such as income, unemployment, inflation, interest rate, and also the political violence, both domestic and regional. The main motivation of the study is to have a better understanding of crime as well as finding and suggesting alternative ways of approaching crime. We analyzed 21 countries, with data spanning from 1960 to 2001. We adopted the model and framework introduced by Viren (2001) based on Becker (1968), Block and Heineke (1975). However, we slightly modified by rephrasing it in order not to only capture the long run relationship but also the short run adjustment. We employed the panel-error-correction based cointegration (Persyn and Westerlund (2008)) to analyze and estimate the model. A number of important findings are extracted from the analysis in accordance to the objectives of this study. Firstly, we discover a negative long run relationship between income and crime; positive long run relationship between inflation and crime; unemployment and crime; as well as lending rate and crime. As for the political violence variable, domestic political violence seems to be negatively related; on the contrary regional political violence is positively related. We believe this might be attributed to the spillover effect. All the signs are as anticipated and justified in this study; and are concurrent with most of the past literatures.

Keywords: Crime; economic variables; panel-error correction based cointegration

ABSTRAK

Kajian ini menyelidik perhubungan di antara jenayah dan pembolehubah ekonomi sosio dan makro seperti pendapatan, pengangguran, inflasi, kadar faedah serta jenayah politik, merangkumi domestik dan wilayah. Motivasi utama kajian adalah demi mendapat pemahaman lebih baik mengenai jenayah serta mendapatkan hasil kajian serta mencadangkan cara alternatif memerangi jenayah. Kami menganalisis 21 negara, data mencakupi tahun 1960 hingga 2001. Kami mengadaptasi model serta kerangka yang diperkenalkan oleh Viren (2001) berasaskan Becker (1968), Block dan Heineke (1975). Walau bagaimanapun, kami membuat sedikit pengubahsuaian dengan hasrat bukan sahaja mendapat kesan jangka panjang, tapi juga penyesuaian jangka pendek. Kami menggunakan Kointegrasi Pembetulan Ralat Panel (Persyn and Westerlund (2008)) untuk menganalisa dan meramal model. Sejumlah hasil dapatan dapat ditemui dari analisis ini bersandarkan objektif kajian. Pertama, kami mendapati terdapat hubungan jangka panjang negatif diantara pendapatan dan jenayah; hubungan positif jangka panjang diantara inflasi dan jenayah; pengangguran dan jenayah; serta kadar faedah dan jenayah. Manakala untuk jenayah politik, jenayah politik domestik didapati berhubung negatif; berlawanan dengan kekejaman politik wilayah yang berhubung positif. Kami percaya ini mungkin diakibatkan oleh kesan limpahan. Kesemua dapatan kajian adalah seperti diramal dan dijustifikasikan didalam kajian ini; dan selari dengan kebanyakan kajian lampau.

Kata kunci: Jenayah; pembolehubah ekonomi; Kointegrasi Pembetulan Ralat Panel

INTRODUCTION

Crime is an important subject of study; though sensitive in nature but it has emerged as one of the favorite subjects of discussion in recent years across the world. It cannot be argued that crime is an utmost important subject of study; the fact that all layers of society and governments are deeply concerned with the rising statistics of criminal activities. Further, this has been made worse by the exposure given by the media, both electronic and print by highlighting it on a daily basis. The variations in crime rates across countries and regions are quite obvious. The possible explanations of these variations could somehow be pointed to many different reasons, ranging from distinct definitions of crimes and also due to different reporting rates (percentage of the total number of crimes actually reported to the police).

It can also be contributed by different cultural aspects and even democracy as explained by Lin (2007); whereby compared to non-democratic governments, democratic government punishes major (minor) crime more (less) and hence this crime rate is lower (higher). It cannot be argued that the process of estimating the number of crime actually committed is not an easy task. The figures do not necessarily provide an accurate picture, because they are influenced by variable factors. Examples of these factors are such as the willingness of victims to report crimes. Media sensationalizing certain types of crime also seriously distorts the public's view. The better option would be to rely on the compilation and publication of detailed statistics of crime by the respective and responsible government departments.

The loss of property, lives and misery due to crime are well researched and documented. In a study on the United States of America, Freeman (1996) investigated and estimated the total cost due to crime. He duly concluded that for the year 1995, the estimated loss due to crime in the United States of America was roughly estimated to be around 2 percent of its Gross Domestic Product (GDP). He further claimed that another 2 percent of its Gross Domestic Product (GDP) was allotted to fund the crime control activities. Freeman (1996) further claimed that the state of California spent more on prisons compared to the expenditure of other productive sectors such as expenditure on higher education whereby prisons budget allocation increased from 2 percent in 1980 to 9.9 percent in 1995 compared to the shrinking of spending on higher education (12.6 percent in 1980 to 9.5 percent in 1995).

Looking at the number of studies being conducted, there has been a marked increment in the crime studies. The results are also fiercely debated. Comparative criminology studies have been surfacing and gaining in popularity in recent years, especially quantitative studies to investigate the impact of the development in the society to the crime trends and types of crime.

The development of several new theories has helped to understand the crime phenomenon. Nevertheless, criminologists have developed several theories of the phenomenon. Biological theories of criminal activity are surfacing rampantly throughout the world, especially in the western world towards the end of 19th and early part of 20th centuries; reigniting the interest in crime studies. The biological characteristics of crime offenders including facial features and their skulls, as well as their chromosomal composition and body type, are the pillars of this theory. However, as time goes by, the support for these theories has waned. In the later part of 20th century, a variety of hereditary and biochemical factors have been linked to the incidences of crime whereby they claimed that an adoptee has a higher probability of ending as a criminal compared to a biological child because even if their adoptive parent is not criminal but their biological parent is. Some other notable studies have claimed that hormonal and certain neurotransmitter imbalances are somehow correlated with crime. Modern crime theories have however pinpointed the occurrence of crime to the strain in society that is caused due to several phenomena.

A point to be noted is that the effects of crime encompass mental anguish, misery, the loss of property and lives among others. Imrohorglu et al. (2006) mentioned that according to United Nations Interregional Crime and Justice and Justice Research Institute, people being victimized by property crime (as a percentage of the total population) varies between 14.8 percent in New Zealand to 12.7 percent in Italy, 12.2 percent in U.K., 10.0 percent in U.S., and 3.4 percent in Japan. We agree that comparing crime statistics from different jurisdictions is quite complicated and most of the time it depends on the respective countries legal definition and will most probably differ across countries. That is why the countries will be chosen meticulously and great attention will be paid in ensuring the uniformity of the crime statistics. It is also due to this complexity that this study will be done on total crimes and not disaggregated crimes since the technicalities involved are very complex.

Apart from these definitional issues, the differences in the levels of reporting of criminal incidents among the countries also explain the number of countries chosen in our study. It is important to note that comparing data on crime among countries that are fundamentally different might distort our analysis and provide wrong conclusions. To quote a few examples, in some countries it would be taboo for the women to report cases of sexual abuse, molest or rape compared to other developed nations that encourage the women to be bold and come forward without any fear.

The crime statistics which are available and used in this study are handled with caution, and to avoid discrepancies in the data, we tried to minimize the source. One of the possible explanations for the divergence might be that the data are obtained through different sources. Apart from the discrepancies themselves, is the

availability of these data sets, since some countries are reluctant to provide them due to the sensitivity of the data. We took extra effort to ensure that our data have long time series, as this is critical especially in measuring crime trends-over time.

It is a general consensus that crime is closely related with economic variables such as income, income inequality, unemployment, inflation and others. These variables cause strain in the society and ultimately push people to commit crime. The punishment meted out by respective countries also plays a part in attracting people to commit crime. The study of Levitt (2001) pointed out that the national-level time series data are vital and important in answering criminological questions as these research questions; thus, a reason for us to look for continuous time series across countries. Figure 1 below is the theoretical framework of our study in which we strongly believe, and as past literatures have suggested, macroeconomic variables are closely related in the occurrence of crime. They indeed cause strain in the society, and as crime causation theories claimed, these induce crime.

The after effect of crime is also devastating; its impact on an economy, its development, as well as the amount of money and energy generated to minimize the crime incidences are quite significant. The cost of crime to the economy is quite enormous, thus the need to understand and tackle the complicated issues is found wanting, thus the motivation of this study.

As per the interrelation between the economic variables and crime as in Figure 1, unemployment is one of the most popular variables that are normally thought to be closely related with the occurrence of crime. Losing

a source of income, would induce strain, would act as a catalyst to drive people towards crime, where primarily is to sustain their lives. On the other hand, for those who are used to living in the fast lane, crime would be an attractive choice in sustaining their high standard of living. Moving towards inflation, it cannot be dismissed that any increase in general price level would result in a decrease in purchasing power; thus, creating strain which in turn would propel people to commit crime.

As for income inequality, a wide gap could create tension and strain; jealousy could creep in and could create uneasiness and push the lower bracket of income earners to commit crime. The level of income itself could also act as a catalyst for crime; extremely low level of income would translate into hardship in life, which in turn will create strain. Level of education, could be related to crime from two perspectives. One, the higher the level of education, the more sophisticated the people could become criminals; on the other hand, low level of education could also be the reason on why people committing crime. Thus the need to analyze all the variables is crucial, in order to understand their relationship with crime incidences.

A REVIEW ON RELATED LITERATURE

This section will focus on the empirical review on the various links between crime and, socio- macroeconomic variable. Among of the important economic variables that usually being associated with crime are the equality and equity variables. It cannot be denied that equality and equity which are considered as the norms that promote

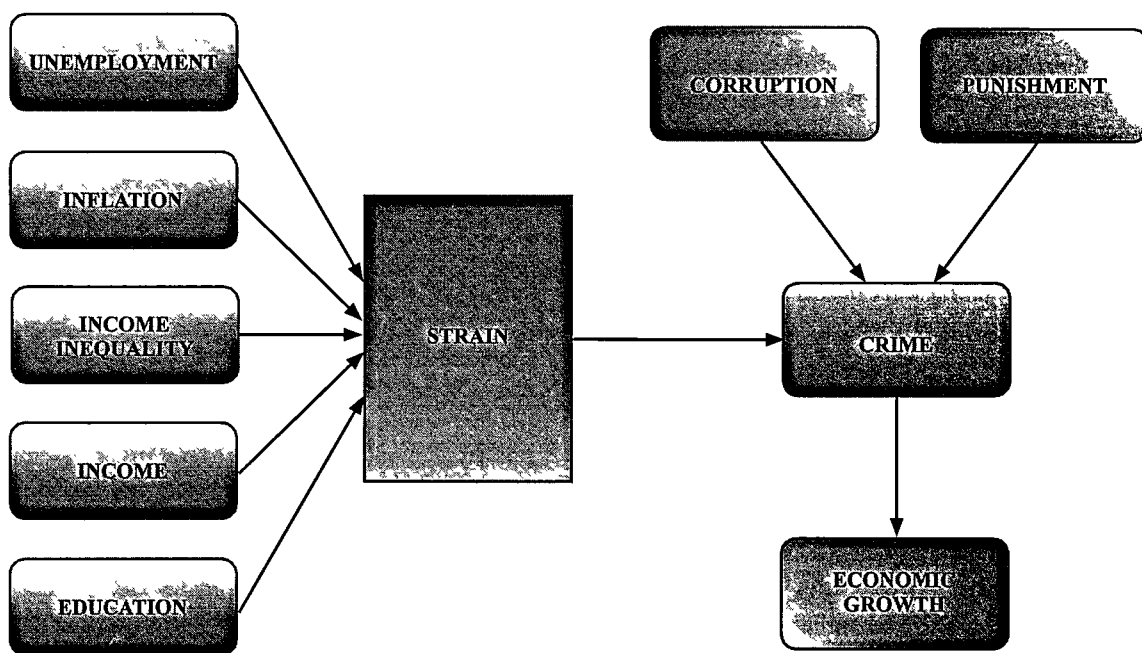


FIGURE 1. Interrelation between Socio and Macroeconomic Variables and Crime

fairness are thought to be closely related to the level of criminal activities. Economists generally are in the agreement that rising inequality makes problems like poverty and crime more attractive. Numerous esteemed researchers have produced studies on these linkages such as Josten (2003), Chisholm and Choe (2005), Madden and Chiu (1998), Brush (2007) and Lo and Jiang (2007), to name a few. Josten (2003) strengthened this idea by explaining that individuals who are blessed with above average human capital endowment will most probably engage in legal activity; and vice versa where for those of below normal average will engage in the life of in crime. He further elaborated that worsening income distribution, will lead to envy among the people and will result in an increase in the share of the population that engages in criminal activity. Thus, reduces the security of individual property rights. On the other hand, Chisholm and Choe (2005) found that there are mixed and ambiguous results in the empirical studies that use various income variables as a proxy to the expected net gains from crime.

Madden and Chiu (1998) claimed that it just seems reasonable and justified to expect that the level of property crime will somehow be influenced in one way or another by the distribution of income or wealth due to the close relationship between these variables. Brush (2007) investigated the impact of income inequality on crime in United States counties by employing the datasets that were derived from the U.S. Census Office's County and City Data Books corresponding for the period of 1994 and 2000. He employed both cross-sectional and first-differenced approaches and the methods produced some important but differing results. The cross-sectional regression showed that after controlling for the other variables there is a significant positive relationship between the Gini coefficient (which was the proxy for the income inequality) and reported crime rates. On the contrary, the results of the first difference estimation method showed that the dynamism of income inequality has a meaningful adverse relationship with the dynamics of crime rate. He further acknowledged these opposing results, and mentioned that this might be due to, either the 10-year time-series dynamics were different from long-term equilibrium cross-sectional relationships or that coefficient estimates were biased in both regression specifications. In this study, we take into account of his suggestion to include more economic variables (other than income inequality) in order to get better results and more robust coefficient estimates.

Another time series study linking income inequality and crime that arose the interest and worth mentioning is the study by Lo and Jiang (2007) on the subject of, rising inequality and increasing crime in China. They did mention in their study that during the reform period, China was facing problems of rising income inequality coupled with rising crime rate. Another prime concern for policy makers and often thought to be closely related with crime is the level of unemployment. Whether the

linkage is association or causation still leaves many researchers pondering. The results were ambiguous and mixed and often contradicted to one another. Notable studies that could not be missed on this subject are by Agell and Nilsson (2003), and Papps and Winkelmann (1999). Both studies found strong positive relationship between unemployment and crime. In an extensive analysis of aggregate research, one more important study is by Chiricos (1987) who managed to find meaningful and positive linkages between unemployment and crime, especially property crime. In fact he found that unemployment indeed has a statistically significant positive effect on property crime in 40 percent of the studies that he conducted. However the effect of unemployment on violent crime is only found to be statistically significant and positive in 22 percent of the study. Other studies linking income inequality and crime are by Baharom and Habibullah (2008), where they duly concluded that income inequality in Malaysia is not related with crime in Malaysia.

Economic condition also seems to be one more popular variable in crime studies judging by the large number of literatures that are using it. It is assumed to be closely related to the level of crime. After all, it is one of the most important economic variables in determining the status of a person or a nation. Recession is believed to be able to cause economic adversity and would encourage criminal activity. Becker (1968) explained that improvements in legitimate labor market opportunities caused by improvement in a nation's economy makes crime relatively less attractive. These results clearly supported the opinion of economic conditions related to the economic cycles; such as employment opportunities and salaries in legal activities, having a strong effect on crime. In contrast, Chisholm and Choe (2005) explained the empirical studies of crime economics with regards to the economic conditions are contradictory to one another and often produced mixed results. Other studies that support improving economic conditions will result in a fall in the level of criminal activity include Pyle and Deadman (1994), Hale (1998) and Masih and Masih (1996), Habibullah and Law (2007) and Habibullah and Baharom (2008).

A general and widely agreed notion of inflation is that, inflation is an event whereby there is a persistent increase in the level of consumer prices (which is normally reflected by the Consumer Price Index (CPI)). In other words, it is a persistent decline in the purchasing power of money, caused by an increase in available currency and credit beyond the proportion of available goods and services. In times of inflation, people will encounter difficulty in finding means to lead a normal life. We believe that these problems will ultimately cause strain and drive people to commit crime, as they are unable to lead the life that they were used to prior to inflation. However, an interesting figure published on the website of McClellan Financial Publication, reproduced in Figure

2.1 below, show an astounding relationship between United States robbery crime rate and United States annual CPI growth shifted forward by 1 year. They seem to be in harmony, their trends are almost identical.

Studies linking inflation and crime rates are attributed to Seals and Nunley (2007) and Coomer (2003). Seals and Nunley (2007) investigated the effect of inflation and labor market dynamics on property crime rates in United States and they found that, inflation is indeed statistically significant, positive, and persistent for all property crime rates examined. Coomer (2003) attempted to explore the relationship between unemployment, inflation and poverty rate and crime also in the United States and found that unemployment, inflation and poverty rate are all positively correlated to crime as expected.

METHODOLOGY

This section will focus on the model specification used in this study based on the theoretical arguments in the theoretical and literature review. We will be testing for twenty one countries with data sets spanning from 1961 to 2001. The limited number of countries is due to the need for long time series data for our study. Only these 21 countries have consistent and uniformed data available on a long time series basis. Mainly we will be utilizing panel data analysis, as mentioned by Gujarati (2003),

panel data analysis endows regression analysis with both a spatial (cross-sectional units of observation) and temporal (periodic observations characterizing the cross-sectional units over time) dimension. The combination of time series with cross sections can enhance the quality and quantity of data in ways that would be impossible using only one of these two dimensions.

We will employ Pool Mean Group estimator as per Pesaran et al. (1999) if the panel data are found to be cross-sectional independent. However, if the panel data are found to be cross sectional dependent, we will be employing the Westerlund error-correction-based panel cointegration test (Persyn and Westerlund (2008). It is efficient as well as computationally more convenient and allows bootstrapping of critical values to overcome cross sectional dependence (if any).

Under this section, the empirical model that will be estimated is discussed.

The general functions are as below:-

$$CRIME = f\{SOCIO, MACRO, others\} \quad (1)$$

Equation (1) could be expanded to:

$$\ln CRIME_{ijt} = \alpha_0 + \alpha_1 \ln socio_{it} + \alpha_2 \ln macro_{it} + \alpha_3 \ln others_{it} + \varphi_{ijt} \quad (2)$$

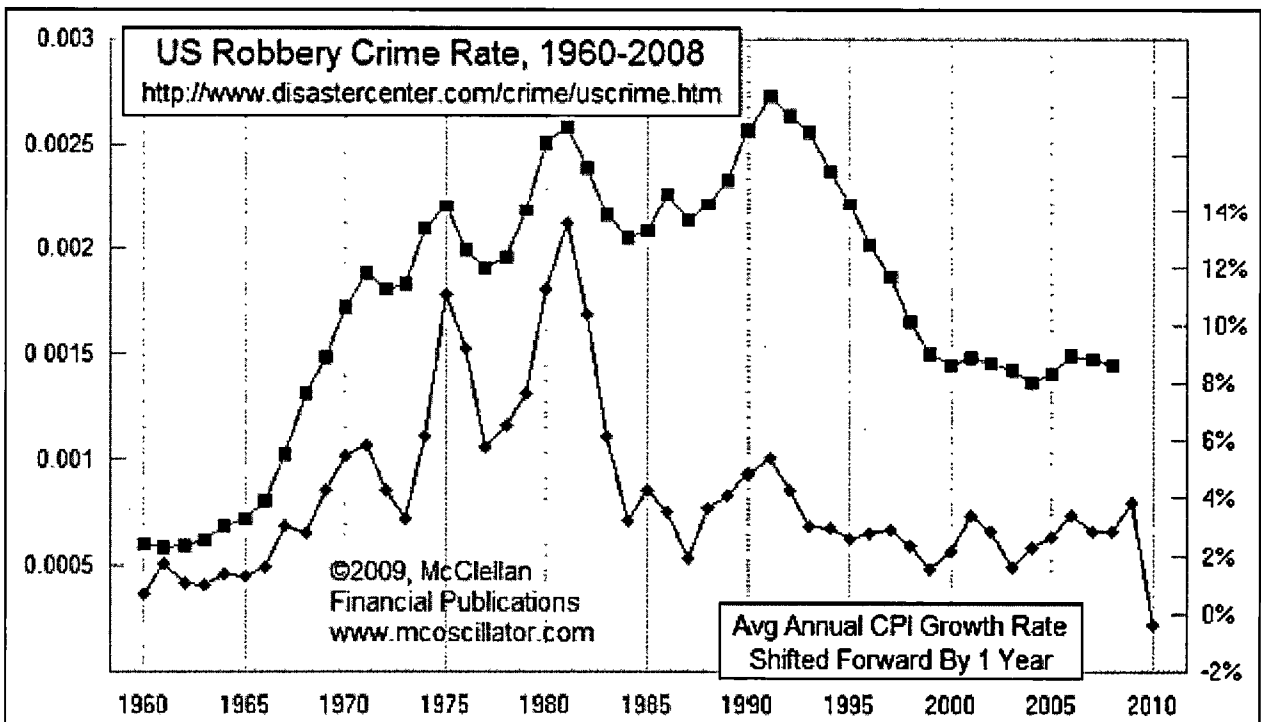


FIGURE 2. US Robbery Crime Rate and US CPI Growth +1

Source: McClellan Financial Publication (<http://www.mcoscillator.com>/accessed on 19/01/2010)

Equation (2) hereby can be extended as follows:

$$\ln CRIME_{ijt} = \beta_0 + \beta_1 \ln GDPpc_{it} + \beta_2 \ln inequa_{it} + \beta_3 \ln int_{it} + \beta_4 \ln inf_{it} + \beta_5 \ln unemp_{it} + \beta_6 \ln politicalviolence_{it} + \varepsilon_{ijt} \quad (3)$$

Where $CRIME_j$ is the occurrence or incidence of crime per capita.

Thus, due to the need to obtain both long run and short run adjustment, and as suggested further by Viren (2001), we came up with an error correction cum cointegration model as per Equation (4) model for crime that will be estimated in our study:

$$\ln totalcrime_t = \alpha_0 + \alpha_1 \ln totalcrime_{t-1} + \alpha_2 \ln GDPpc_t + \alpha_3 \ln inequa_t + \alpha_4 \ln int_t + \alpha_5 \ln inf_t + \alpha_6 \ln unemp_t + \alpha_7 \ln politicalviolence_t + v_t \quad (4)$$

Thereby specifying $EC_t = v_t$,

$$EC_t = \ln totalcrime_t - (\alpha_0 + \alpha_1 \ln totalcrime_{t-1} + \alpha_2 \ln GDPpc_t + \alpha_3 \ln inequa_t + \alpha_4 \ln int_t + \alpha_5 \ln inf_t + \alpha_6 \ln unemp_t + \alpha_7 \ln politicalviolence_t) \quad (5)$$

Subsequently:

$$EC_{t-1} = \ln totalcrime_{t-1} - (\alpha_0 + \alpha_1 \ln totalcrime_{t-2} + \alpha_2 \ln GDPpc_{t-1} + \alpha_3 \ln inequa_{t-1} + \alpha_4 \ln int_{t-1} + \alpha_5 \ln inf_{t-1} + \alpha_6 \ln unemp_{t-1} + \alpha_7 \ln politicalviolence_{t-1}) \quad (6)$$

Thus the *ECM* model to be estimated is as below:

$$\ln totalcrime_{it} = \beta_0 + \beta_1 \ln EC_{t-1} + \sum_{j=1}^p \beta_2 \Delta \ln totalcrime_{i,t-j} + \sum_{j=0}^q \beta_3 \Delta \ln GDPpc_{i,t-j} + \sum_{j=0}^r \beta_4 \Delta \ln inequa_{i,t-j} + \sum_{j=0}^u \beta_5 \Delta \ln int_{i,t-j} + \sum_{j=0}^v \beta_6 \Delta \ln inf_{i,t-j} + \sum_{j=0}^w \beta_7 \Delta \ln unemp_{i,t-j} + \sum_{j=0}^y \beta_8 \Delta \ln politicalviolence_{i,t-j} + \omega_{it} \quad (7)$$

The selected variables for the regressors for the study are as follows:-

- ▶ $\ln GDPpc_{it}$ is the logarithm of real gross domestic product per capita,
- ▶ $\ln inequa_{it}$ is the logarithm of income inequality,
- ▶ $\ln int_{it}$ is the measurement for interest rate (lending rate was preferred since its close relationship with crime),
- ▶ $\ln inf_{it}$ is the logarithm of inflation,
- ▶ $\ln unemp_{it}$ is the logarithm of unemployment,
- ▶ $politicalviolence_{it}$ is the logarithm of the political violence incidence both domestic and regional and.
- ▶ ε_{ijt} is the error term.

As mentioned earlier, because of the constraint in getting long time series data that is uniformed, we could only end up with twenty one countries (21) which are United Kingdom, Austria, Cyprus, Denmark, Estonia, Finland, France, Greece, Hungary, Ireland, Italy, Netherland, Norway, Poland, Spain, Sweden, Australia, Canada, Japan, New Zealand and United States of America.

PROBLEMS WITH CROSS SECTIONAL DEPENDENCE IN PANEL DATA

Westerlund (2007) mentioned that recent research has turned toward panel data, in the hope that the estimation and inference made can be more precise through the pooling of information contained in a cross-section of similar units, such as countries, regions, companies, or even households due to constrains of short span of many economic time series. He further reiterated that pooling data in this way is valid only if the cross-sectional units are independent of each other, an assumption that is perhaps unreasonable. It is important to determine whether the panel data that will be used in this study, are cross section dependent or cross section independent. This is because only then can we decide to employ the chosen method of pre-testing of order of integration and the decision of estimators to be utilized. If the data are found to be cross sectional independent, then we will proceed with the first generation panel unit root test as done by Maddala and Wu (1999), Levin, Lin and Chu (2002), and Im, Pesaran and Shin (1997, 2003). After the pre-testing, we will proceed with the pool mean group estimator as per Pesaran et al. (1999). On the contrary, if the panel data are found to be cross sectional dependent, then we will proceed with the second generation panel unit root test as done by Pesaran (2003) and Bai and Ng (2004) whereby both of these tests cater for cross sectional dependence. After the pre testing we will proceed to employ the Westerlund error-correction-based panel cointegration test (Persyn and Westerlund 2008).

TABLE 1. Definition of variables used in the study

Variable name	Brief description	Sources of data
Total Crime	Defined as against the 'penal code' or 'criminal code' and excludes less serious crimes (misdemeanors). The crime rate, or the number of cases reported are used.	Home Office Statistical Bulletin 12/03, Home Office, United Kingdom/ Japan Statistic Department/ New Zealand Law and Justice Department
Income inequality	Data collected based on annual survey of wages in the industrial sector globally.	Deininger & Squire inequality measures and the UTIP-UNIDO pay inequality measures,
Gross Domestic Product per capita	Income per capita. It is the real income in US dollars.	WDI/IFS International Historical statistic
Interest Rate	Lending Rate.	WDI/IFS International Historical statistic
Inflation	The change in the Consumer Price Index.	WDI/IFS International Historical statistic
Unemployment rate	The rate of unemployment	WDI/IFS
Domestic and Regional Political Violence	The extent to which public power is exercised for private gain, including petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.	Integrated Network for Societal Conflict Research (INSCR)

DATA SOURCE

All variables that will be used in this are obtained from various sources, which are summarized in the following Table 1.

EMPIRICAL RESULTS

To test for cross sectional dependence in this study, Pesaran's CD test was preferred over the Breush and Pagan test due to the nature of data in this study which have a finite T and being unbalanced across N. We started the analysis by using crime per capita as the dependant variable while the independent variables are income (gdp), unemployment (lunemp), inflation (linf), lending rate (lint), income inequality (lineq), major domestic political violence (lregcv) and major regional political violence (lregint). The results overwhelmingly concluded that it is not cross sectionally independent, thus, we rejected the null hypothesis (H_0 : Cross sectionally independent) at 1% level.

Since the results of the cross sectional dependence test showed that the panel data are found to be cross sectionally dependent, we proceeded with the second generation panel unit root test, albeit the test proposed by Pesaran (2003) and as written by Pesaran (2003). It is parallel to Im, Pesaran and Shin (IPS, 2003) test whereby it is based on the mean of individual DF (or ADF) t-statistics of each unit in the panel. Further, according to Pesaran, to eliminate the cross dependence, the standard DF (or ADF) regressions are augmented with the cross section averages

of lagged levels and first-differences of the individual series (CADF statistics). Also considered was the truncated version of the CADF statistics which has finite first and second order moments. It allows the avoidance size distortions, especially in the case of models with residual correlations and linear trends (Pesaran 2003).

In the case where T is fixed, to ensure that the CADF statistics do not depend on the nuisance parameters the effect of the initial cross-section mean must also be eliminated. This can be achieved by applying the test to the deviations of the variable from initial cross-section mean (Pesaran 2003). Lags of the dependent variable may be introduced to control for serial correlation in the errors. The lags of order of the dependent variable in this study were chosen using the Akaike model selection criteria. An additional information from Pesaran (2003) is that in the case of unbalanced panels, only standardized $Z[t\text{-bar}]$ statistics can be computed (the reason why only standardized $Z[t\text{-bar}]$ statistics appear in the results illustrated as per Table 2 and analogous to IPS (2003) test). Pesaran's CADF is consistent under the alternative that only fractions of the series are stationary.

From Table 2 it can be safely concluded that at 1% level of significance, the Pesaran CADF test revealed that all series are not stationary at level but are stationary after taking the first difference. In other words they are I(1) variables at 1% level of significance. Therefore it would be essential to proceed with analysis to check for the existence of long run and dynamic relationships among the series.

Preceding the results obtained, and since all series are I(1), we employed the four panel error correction

TABLE 2. Pesaran CADF unit root test results

Variable	Level	1 st difference
Lcrime	-0.550[2]	-5.453[2]***
Lgdpc	1.533 [2]	-3.019[2]***
Linf	-1.574[3]	-5.060[3]***
Lunemp	-1.040[2]	-5.810[2]***
Lint	-1.636[2]	-8.515[2]***
Lineq	-0.577[2]	-6.703[2]***
Lregcv	-1.451[1]	-7.461[1]***
Lregin	0.630[2]	-8.372[2]***

Notes: *** denotes rejection of the null hypothesis at the 1% level, lag(s) in parenthesis[]

based cointegration test developed by Westerlund (2007). The underlying idea is to test for the absence of cointegration by determining on the existence of error correction for individual panel members or for the panel as a whole. According to Westerlund (2007), the tests are very flexible and allow for an almost completely heterogeneous specification of both the long- and short-run parts of the error correction model, where the latter can be determined from the data. It is also a logical choice since it can cater for series with unequal length or in other

words, unbalanced panel. Since our data are found to be cross sectionally dependent, we obtained the critical values via bootstrapping so that it will be robust as per suggestion by Persyn and Westerlund (2008). Due to the limitation of the analysis and considering the degree of freedom, we analyzed the two models separately. Model 1 consists of income level (lgdpc), inflation (linf), interest rate/lending rate (lint), inequality (lineq), unemployment (lunemp) and internal political violence (lregcv) as the independent variables; while Model 2 consists of income level (lgdpc), inflation (linf), interest rate/lending rate (lint), inequality (lineq), unemployment (lunemp) and regional political violence (lregin) as the independent variables.

From the following Table 3, we can conclude that the results are quite robust even though we used different political violence variables in the models; whereby the coefficients are almost identical in both estimations. When the first model was estimated, 14 out of 21 countries namely Austria, Denmark, Finland, Greece, Italy, Netherland, Norway, Poland, Spain, Sweden, Australia, Canada, Japan and the United States of America produced a significant error correction term, while in the second model only 12 out of 21 countries produced significant error correction term (the same countries as previously except for Sweden and the

TABLE 3. Results of Error-Correction Model estimation

Country	Model 1	Model 2
1) United Kingdom	-0.125675[-1.00]	-0.1218662[-1.22]
2) Austria	-1.468758[-4.90]***	-1.548432[-5.27]***
3) Cyprus	-0.3466305[-1.18]	-0.3385126[-0.88]
4) Denmark	-0.1315718[-2.70]***	-0.1051445[-2.31]***
5) Estonia	-0.2392652[-1.48]	-0.1407963[-1.50]
6) Finland	-0.003936[-2.33]**	-0.0243719[-1.66]*
7) France	-0.0201682[-0.07]	-.0196388[0.10]
8) Greece	-2.053128[-3.84]***	-1.654064[-4.07]***
9) Hungary	-0.674103 [-0.53]	-0.1049742[-0.10]
10) Ireland	-0.0476851[-0.51]	-0.0399215[-0.42]
11) Italy	-0.2844191[-2.29]**	-0.2396399[-3.05]***
12) Netherland	-0.0434499[-1.66]*	-0.0717134[-1.99]**
13) Norway	-0.0852008[-2.28]**	-0.0506093[-2.18]**
14) Poland	-0.3106688[-2.40]**	-0.169421[-2.62]***
15) Spain	-0.3987064[-1.69]*	-0.3659124[-1.78]*
16) Sweden	-1.263375[-6.39]***	-0.4446945[-1.19]
17) Australia	-0.7989096[-4.83]***	-0.7989096[-4.83]***
18) Canada	-0.1485437[-2.34]**	-0.1260953[-2.61]**
19) Japan	-0.4433493[-3.92]***	-0.1324564[-2.15]**
20) New Zealand	-0.7034458[-1.32]	-0.7034458[-1.32]
21) United States of America	-0.4414999[-3.90]***	-0.0851018[-0.53]

Notes: ***/**/* denotes rejection of the null hypothesis at the 10% level, 5% level and 1% level respectively, standardized Z[t-bar] statistics in parenthesis[]

United States of America). Based on the significant error correction term and based on the Granger Representation theorem (Engle and Granger (1987)), it implies that the error correction term will be significant if cointegration exist. Hence, we could conclude that cointegration exists between crime incidence and the regressors.

As a group, as per the result displayed in Table 4 above, all the independent variables are showing the same sign of coefficients even though they are not identical. Income and domestic political violence have negative relationship with crime incidence while all the other regressors have positive relationship. Meanwhile, the second model's results are consistent with the results in the first model; income has negative relationship while all the other regressors including regional violence have positive relationship. It is interesting to note that, across both the models, the results are quite consistent and robust. Domestic political violence and regional political violence were used interchangeably due to the constraints of the estimator which only allows for 6 covariates, the results seemed to be consistent. In the following paragraphs, an elaborate summary on each of the independent variable is given.

TABLE 4. Estimated long-run relationship

Variable	Model 1	Model 2
Lgdpc	-1.620376 [-1.68]*	-1.3791343[-1.69]*
Linf	0.2087849[1.35]	0.3527828[0.76]
Lunemp	0.9050554[1.67]*	1.487888[1.69]*
Lint	3.270281[0.83]	0.0259779[0.03]
Lineq	1.568107[1.67]*	1.240228[1.69]*
Lregcv	-1.061771[-1.08]	-
Lregint	-	0.6909483[1.68]*

Notes: */**/** denotes rejection of the null hypothesis at the 1% level, 5% level and 10% level respectively, standardized Z[t-bar] statistics in parenthesis []

CRIME AND INCOME

It is a widely believed that income is as one of the major macroeconomic variables affecting crime. In this study, it is found that income level of the economies seems to have an adverse relationship with crime incidence with an elasticity of ±1, whereby an increase in income level has the tendency of reducing crime. Income is indeed an important determinant of welfare of a human being, thus an increase or decrease in the level of income will definitely increase or decrease the level of strain faced, which will play an important role of push or pull the urge of committing crime as per the psychological theory. The finding is more or less in agreement with most of the literatures. However, Chisholm and Choe (2005) claimed that studies linking crime and income often produced mixed or contradictory results; thus their relationship is

ambiguous. It is important to note that there are a number of other studies which found strong cointegration or long run relationship between these variables.

As mentioned by Becker (1968), when a nation's economy becomes stronger, improvements in legitimate labor market opportunities make crime relatively less attractive, concluding that improved economic condition (better income level) will reduce crime. Another important study that is consistent with our finding is that of Fajnzylber et al (2002) who found that GDP per capita is inversely related with crime. As for the reference for a primary data based study, Levitt (1999) also found a similar result in his empirical study using primary data for the state of Chicago. On a single country analysis frontier, it is worth to mention the study by Habibullah and Law (2007) who also found cointegration between crime and income per capita on their study for Malaysia by using time series data from 1973-2003. Other notable studies which concur our finding on the adverse relationship between income (GDPC) and crime are studies by Pyle and Deadman (1994), Hale (1998) and Masih and Masih (1996).

CRIME AND INFLATION

Inflation is a phenomenon that is dreaded by almost everyone, no matter the angle we are looking from. The notion is that: it is either a persistent increase in level of prices; or persistent decline in the purchasing power. Nonetheless, it is safe to conclude that it will burn a hole in the pocket of consumers, who will find it difficult to lead a normal life. It will lead to strain, as mentioned in earlier chapters, and ultimately drives people to commit crime in order to enjoy the same pleasure or same kind of lifestyle they are used to. One of earliest literature on this matter is the book written by historian David Hackett Fisher (2000) who reiterated the strong correlation between crime and inflation; whereby he traced both the murder and inflation rates in England for over 700 years in his book entitled 'The Great Wave'. He further elaborated on the patterns of crime incidence, whereby it goes up whenever inflation is high, and vice versa. The notable examples of these scenarios are the period of the great depression, when crime was low and the prosperous 80s when crime was record high. Though no econometric or statistical approach was used in his study, nonetheless the explorative by Fisher is an important cornerstone of reference.

In our preliminary result finding, whereby we reproduced the figure by McClellan Financial Publication on the relationship between inflation rate and robbery crime rate in the United States of America, we find that they strikingly moved in tandem, and true to our expected sign of inflation on crime, we find a positive relationship between crime and inflation throughout our three estimation (total, transition and developed). Previous



similar studies that linked inflation and crime, and found positive relationship are as those of Seals and Nunley (2007), Coomer (2003), and Tang and Lean (2007).

CRIME AND UNEMPLOYMENT

It is important to note that majority of the studies (if not all) are in agreement with our finding where unemployment being positively related to crime. One of the main effects of being unemployed, is the lost of source of income. It will be almost impossible to cater to the needs of a normal life. This will add enormous strain to the life of a person, which we believe would push him to the brink of committing crime, thus the unsurprising positive coefficient. It is also concurrent with previous studies which found positive relationship between unemployment and crime such as Agell and Nilsson (2003), and Papps and Winkelmann (1999).

Other agreeable and notable studies on unemployment and crime are by Chiricos (1987) and Raphael and Winter-Ebmer (2008). Further supporting literature, the study by Rupert et al (2008), illustrated that the unemployed have the highest propensity to commit crime compared to the employed. In another study, this time on the country of France, Fougere et al (2009) also found that crime and unemployment are positively associated, and the increase in youth unemployment increases in crime rate. In studies regarding the United States of America, both studies by Neustrom et al (1988) and Lester (1995) also found similar positive relationship between crime and unemployment.

CRIME AND INCOME INEQUALITY

The poor might be tempted to commit crime in order to become rich while the rich commits crime to stay rich. Inequality is a vital indicator to the different classes; a worsening distribution (increasing inequality) will increase the strain, and vice versa. As expected, we obtained a positive relationship between inequality and crime. This is another aspect of this study which concurs with almost all the studies. A large number of studies seems to share similar findings, such as Josten (2003), Madden and Chiu (1998), Fajnzylber et al (2002a, 2002b), Imrohorglu et al (2006), Teles (2004) Lorenzo and Sandra (2008), Magnus and Matz (2008), Brush (2007), Lo and Jiang (2007). Meanwhile an opposing finding was recorded by Choe (2008), who found a negative finding for the sub-component of crime (burglary and robbery). While Teles (2004) claimed that monetary and fiscal policies (which indirectly influence income inequality) have impact on crime. Madden and Chiu (1998) reiterated that it seems reasonable to expect that the level of property crime will be influenced in some ways by the distribution of income.

CRIME AND INTEREST RATE (LENDING RATE)

It is rare for studies of determinants of crime to include interest rate as one of their independent variables. However we have it included since we believe it is closely related to crime. This is because high interest rate will be burdensome to debtors and might entice them to commit crime; and vice versa, where lower interest rate will provide them with an alternative to venture into something legal and meaningful. Thus, for that reason the interest rate chosen is the lending rate; and true to our notions and presumptions, we find a positive relationship between the lending rate and the crime.

CRIME AND POLITICAL VIOLENCE

Another important variable that is rarely used in previous studies are the domestic political violence and regional political violence. We believe that these incidences tend to create chaotic situations leading to occurrence of crime. However due to the limitations of the estimator which allows on 6 covariates at any point of time due to the size of the sample, we used them interchangeably. We are pleased to note the robustness and consistency of the results remained no matter which variable was used; the sign of the other coefficients also remained the same. The results are quite interesting, while the domestic political violence is negatively related to the level of crime; regional political violence is positively related to crime. As far as we are aware no comparison could be made with previous literature since we are the only ones who have used these variables. The conclusion that we could possibly make is that it might be due to the spillover effect, whereby whenever a domestic political violence occurs people who are affected will flee out of the country. These people may possibly commit crime in another country which probably explains the positive relationship between regional political violence and crime.

CONCLUSION

A number of important findings are extracted from the analysis. The most important is the determination and confirmation of the negative long run relationship between income and crime. This is where high income allows people to enjoy a better life; and vice versa when worsening income could induce strain and create pressure on people. As for the positive long run relationship between inflation and crime, the logic and explanation are almost the same; higher prices benefit the firms and businesses whereby they received much higher return and profit. However for a majority of people, who are actually fixed-income earners, would definitely feel the pinch due to higher prices which translate to worsening purchasing power; again, this of which will induce strain.

On the other hand, the same relationship between unemployment and crime applies in the relationship between lending rate and crime. Losing source of income means one has to seek elsewhere in order to survive; but some might take the shortcut, which is committing crime. A steep lending rate is a nuisance for people since the cost of repayment is burdensome. As for the political violence variable, domestic political violence seems to be negatively related; on the contrary regional political violence is positively related. We believe this might be attributed to the spillover effect. Whenever domestic political violence erupts, people will be fleeing away, thus the logic of the negative sign. At the same time, whenever there is regional political violence, outsiders proliferate the country, and this might contribute to the increase in crime (positive relationship). All these signs are as anticipated and justified in this study and are concurrent with most of the past studies.

This study also shows the importance of policy makers in drafting and executing crime combating policies to think out of the box. Instead of combating crime through the traditional way and keep meting out severe sentences, they should focus in preventing the crime by correcting the macro imbalance.

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Who Pays and Who Gets What from National Parks Protection? Case of Taman Negara in Malaysia

(Siapa Membayar dan Siapa Mendapat Manfaat dari Perlindungan Taman Negara? Kes Taman Negara Malaysia)

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ABSTRACT

The Malaysian National Park or Taman Negara (TN) is a totally protected forest which covers an area over 4,000 square kilometres, straddling across three relatively less developed north-eastern states of Pahang, Terengganu and Kelantan in Peninsular Malaysia. Forest conservation inevitably entails equity-efficiency tradeoffs. The local communities may lose all or most of the direct benefits provided by the resource, including foregone benefits such as agricultural development and other alternative uses. While all the other indirect and non-use values may accrue to both local and external communities, foregone benefits may pose a serious policy issue should the affected communities be relatively poorer or have less access to alternative sources of economic growth and development. This study conducts an economic valuation of the benefits and costs of Taman Negara's conservation and its resulting equity impacts to the various stakeholders - global community, Malaysian federal and state governments, and the local community. The study specifically compares the benefits from TN conservation against alternative land uses, namely sustainable logging, and sustainable logging and oil palm development. Based on a social discount rate of 2 percent and lower bound price estimates of carbon and marketed goods prices, the study shows that existing conservation policies provide higher economic benefits compared to other land use options. However, at higher discount rates of 5 and 8 percent, the benefits from the conservation management option against alternative uses may turn negative. Overall results demonstrate a clear equity issue between those who benefited from forest conservation and especially the three relatively less developed states which incurred substantial benefits foregone. To address this issue at the national level, it is recommended that national conservation policies consider the establishment of a National Forest Conservation Fund for compensation of environmental services provided by protected forests, similar to the Payment for Environmental Services scheme. Some portion of the revenue from marketed goods provided by the park particularly recreational services may also be allocated to the state governments. At the international level, the ongoing REDD Plus programmes need to take into account cross country equity issue, particularly countries that have long been involved in pre-existing conservation programme such as the Malaysian Taman Negara.

Keywords: National Parks protection; Taman Negara Malaysia; total economic valuation; efficiency-equity tradeoffs in forest protection

ABSTRAK

Taman Negara Malaysia ialah sebuah kawasan hutan yang dilindungi. Ia seluas 4,000 kilometer persegi, terletak di kawasan yang bersempadan dengan tiga buah negeri yang relatif kurang maju di Semenanjung Malaysia - Kelantan, Terengganu dan Pahang. Perlindungan hutan mewujudkan kesan tukarganti antara ekuiti dan kecekapan. Masyarakat tempatan kerugian manfaat langsung yang dibekalkan oleh sumber Taman Negara, termasuk kos lepas seperti hasil dari pembangunan pertanian dan kegunaan lain. Kebanyakan manfaat tak langsung lain dan nilai bukan penggunaan diperolehi komuniti global. Kos lepas boleh menjadi isu dasar yang serius jika komuniti yang terkesan adalah relatif miskin dan kekurangan akses kepada sumber-sumber alternatif untuk pertumbuhan dan pembangunan ekonomi. Kajian ini melakukan penilaian ekonomi keatas faedah dan kos dari perlaksanaan dasar perlindungan Taman Negara dan kesan ekuiti kepada pelbagai kumpulan berkepentingan - komuniti global, kerajaan persekutuan, kerajaan negeri dan juga masyarakat setempat. Secara spesifik, kajian membandingkan manfaat dari perlindungan Taman Negara dengan kegunaan alternatif seperti pembalakan lestari, dan pembalakan lestari dan pembangunan sawit. Berdasarkan kadar diskaun 2 peratus dan batas bawah harga pasaran karbon dan barangan pasaran, kajian mendapati dasar perlindungan hutan memberikan manfaat ekonomi yang lebih tinggi berbanding dengan guna tanah lain. Walaubagaimanapun, pada kadar diskaun 5 dan 8 peratus, manfaat dari perlindungan hutan menjadi negatif. Dapatan keseluruhan menunjukkan isu ekuiti yang jelas antara mereka yang menerima faedah dari perlindungan

Taman Negara dan mereka (negeri-negeri yang menempatkan Taman Negara) yang menanggung kos dari segi faedah yang terpaksa dilepaskan. Untuk mengatasi isu ini di peringkat nasional, dicadangkan dasar perlindungan alam sekitar negara mengambilkira penubuhan Tabung Konservasi Nasional untuk tujuan membayar pampasan kepada komuniti yang kehilangan kos lepas dari pelaksanaan dasar perlindungan, serupa dengan konsep bayaran untuk perkhidmatan alam sekitar (PES). Beberapa komponen hasil dari perkhidmatan Taman Negara seperti kutipan bayaran masuk dari perkhidmatan rekerasi juga perlu diperuntukkan kepada kerajaan negeri. Di peringkat antarabangsa, program REDD Plus dicadangkan mengambilkira isu ekuiti antarabangsa, terutamanya negara-negara yang telah lama terlibat dalam program-program konservasi hutan seperti kes Taman Negara Malaysia.

Kata kunci: Perlindungan Taman Negara, Taman Negara Malaysia, Penilaian nilai ekonomi jumlah, Tukarganti kecekapan-ekuiti dalam perlindungan hutan

BACKGROUND

The Malaysian National Park or Taman Negara (TN) is a protected forest that covers an area of 4,343 square kilometres spanning across the three north-eastern states of Pahang, Terengganu and Kelantan in Peninsular Malaysia. Each state contributes some 6-7 percent of their total land area to TN. Taman Negara was gazetted as a protected forest way back in 1938 by the then Wildlife Commission of the British colonial government. Its original name was King George National V National Park, the king who ruled Britain and her colonies at the time. Under the various state enactments (Pahang Enactment 1939, Terengganu Enactment 1939 and Kelantan Enactment 1938), which provided the legal basis for the establishment of TN, the National Park was established especially for the purpose of perpetual protection and preservation of indigenous fauna and flora of the country and for the preservation of objects and places of aesthetic historical or scientific interests. Based on the sheer size of the area, TN is considered as the largest national park in South East Asia.

With the exception of Pahang, the two states of Kelantan and Terengganu have been among the poorest and least developed states in Malaysia. In 2004, the average monthly household income for the states was RM1,829.00 and RM1,984.00, respectively, as compared to the national average of RM3,249.00 (Malaysia 2006). With respect to poverty rate, Terengganu in Peninsular Malaysia had the highest poverty rate of 15.4 percent, followed by Kelantan at 10.6 percent, as compared to the national poverty rate of 5.7 percent. As such poverty eradication programs and rural development have become a major policy focus of the affected states.

Forest protection inevitably entails equity-efficiency tradeoffs. The local communities may lose all or most of the direct benefits provided by the resource, including foregone benefits such as agricultural development and other alternative uses. The loss of foregone benefits from forest conservation, especially for agricultural development for the landless rural poor has long been realized by many state governments in Malaysia. This has been demonstrated by the reluctance of the states

to approve new protected areas. A clear example is the unwillingness of the states of Pahang and Johor to agree to the federal government's request to gazette parts of the states' forests as new protected areas. Under the 3rd Malaysia Plan (1976-80), the federal government had identified the Endau-Rompin forest in Johor and Pahang as the second National Park (TN) (Collins et al. 1991; Berger 1990). Initially, the state government steadfastly refused to hand over the Endau-Rompin area to the federal government as required by the National Parks Act 1980. In 1988, following negotiations with the federal government and continuing pressure from various parties, both the state governments finally conceded to accord the status of national park to the 930-square kilometre forested area of Endau-Rompin.

Given the socio-economic background of the TN affected states and the ever increasing need for new sources of economic growth, it is expected that resentment on the equity issue of TN protection would grow over the years. This is especially more so when the decision to establish the TN was made many years ago (in 1938), long before Malaysia gained its independence in 1957. This issue represents a classical case of conservation and development tradeoffs. Given the above background, this study attempts to appraise the benefits and cost which accrues to different groups of stakeholders from the effects of conservation of TN. Such analysis will help espouse the quantum of contribution of the less developed states for a public cause that benefits a wide range of stakeholders including the global community.

In this study, the total economic value approach was used to analyse the economic merits of forest conservation and alternative uses. Alternative land use options which reflect the likely opportunity costs to the three affected states include sustainable logging, and sustainable logging and oil palm cultivation.

The next section of this paper discusses the concept of conservation policy and equity; the third section explains the methodology for the evaluation of benefits flow of TN; the fourth section presents the results of the economic assessment of forest management alternatives; and the fifth section discusses the policy implications and concluding remarks.

CONSERVATION POLICY AND EQUITY

Table 1 depicts the relationship between forest conservation policy and equity. When a forest tract is totally protected by means of policy, the local community inevitably loses all or most of the direct benefits provided by the resource, including foregone benefits such as agricultural development and other alternative uses. While all the other indirect uses and non-use values may accrue to both local and external communities, foregone benefits may pose a serious policy issue should the affected communities be relatively poorer or have less access to alternative sources of economic growth and development. It is thus clear that the local communities would have to bear the brunt of losing the various direct and foregone benefits due to forest protection policy. This study as mentioned earlier examines the equity impacts of TN conservation by assessing the economic values of forgone benefits incurred by the affected communities. Note the concept of direct, indirect and non-use values in this study follows that of the standard total economic value taxonomy of environmental resources according to Brookshire et al. (1980) and Pearce and Warford (1994).

TABLE 1. Accrued Benefits from Environmental Services

Type of Benefit	Local Community	External Community
Use Values:		
Direct	X	-
Indirect	√	√
Non-Use Values:		
Bequest Value	√	√
Existence Value	√	√

Note: √ is value accruable to the respective communities while X is the foregone direct benefits due to forest protection.

METHODOLOGY

In assessing the economic values of TN, the resource was likened to an asset which generates varying benefit flows under various management options. The total economic value (TEV) of TN service flows was estimated for each management scenario and compared against the baseline scenario (status quo) for a specified period. In this study, the baseline scenario (full conservation) was compared with two other management options, namely sustainable logging, and sustainable logging with oil palm development. In essence, the choice of options is based on what options might be technically and economically feasible given the bio-physical nature of the resource. The two options are thought to be rational land-use alternatives *vis a vis* total protection. Specifically, the following steps were undertaken in assessing the benefit flows under the TEV framework;

1. Identifying and estimating the flow of good and services derived from each management option;
2. Estimating the Net Present Value (NPV) for each benefit flow using a range of social discount rates;
3. Estimating the TEV by aggregating the NPV of each benefit stream for each management option, and
4. Comparing the TEV of the baseline (status quo) option with the given management alternatives and discussing the implications thereof.

Figure 1 illustrates the economic assessment framework for TN while Figure 2 depicts the management options considered in the study. Part 'a' of Figure 2 shows the management option evaluated, namely:

1. Full conservation (status quo scenario)
2. Sustainable logging
3. Sustainable logging and oil palm cultivation

The benefits assessed under the full conservation scenario included recreation, carbon sequestration and non-use values (NUV) of conservation benefits. Under this scenario, logging and harvesting of forest products (rattan) are strictly prohibited. Therefore, the net benefits from timber and rattan are zero. Erosion costs were not assessed as it occurs naturally in unlogged forest areas. The economic benefits of water catchment regulation and medicinal plants were also excluded from this study. However, this may not affect the overall outcome of the study as both provide positive benefits to the existing conservation management.

For the sustainable logging option, only the value of timber stumpage in areas permitted by law and which is economically beneficial was included in the estimation. Highlands exceeding 1,000 metres above sea level were ruled out in the assessment. These were assumed to be fully protected areas. The size of forest area presumably permitted for sustainable logging was 385,214.04 hectares. The accrued benefits and costs under this scenario included timber stumpage, rattan and carbon storage. Soil erosion was considered as cost and therefore deducted from the benefit stream in this scenario. The estimated cost of erosion in this study is based on the benefit transfer method from a study conducted by Mohd Shahwahid et al. (1997).

For sustainable logging and oil palm cultivation management option, 15 percent of the total area in TN was found to be suitable for agriculture (DWNP 1987). Similar to sustainable logging, only areas permitted by the law and which are economically beneficial were assessed. The areas to be considered for sustainable logging and oil palm cultivation were 317,624 hectares and 67,590 hectares, respectively. The rest shall remain under full conservation. The services and goods valued under this management option included stumpage values, rattan, carbon storage and harvested oil palm fresh fruit bunches. Again soil erosion was considered as cost and was deducted from the benefit stream.

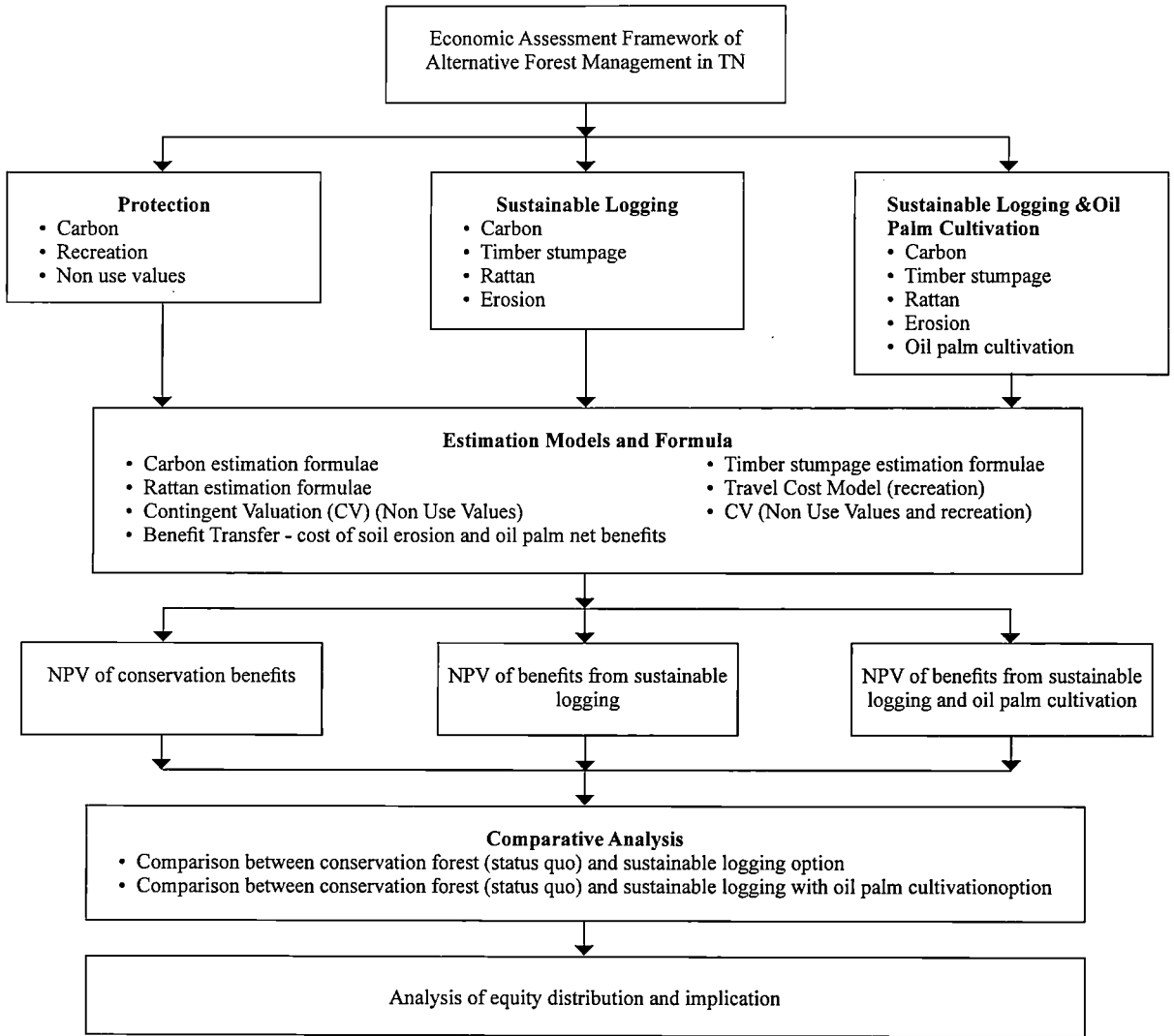


FIGURE 1. Economic Assessment Framework of Forest Management Options for TN

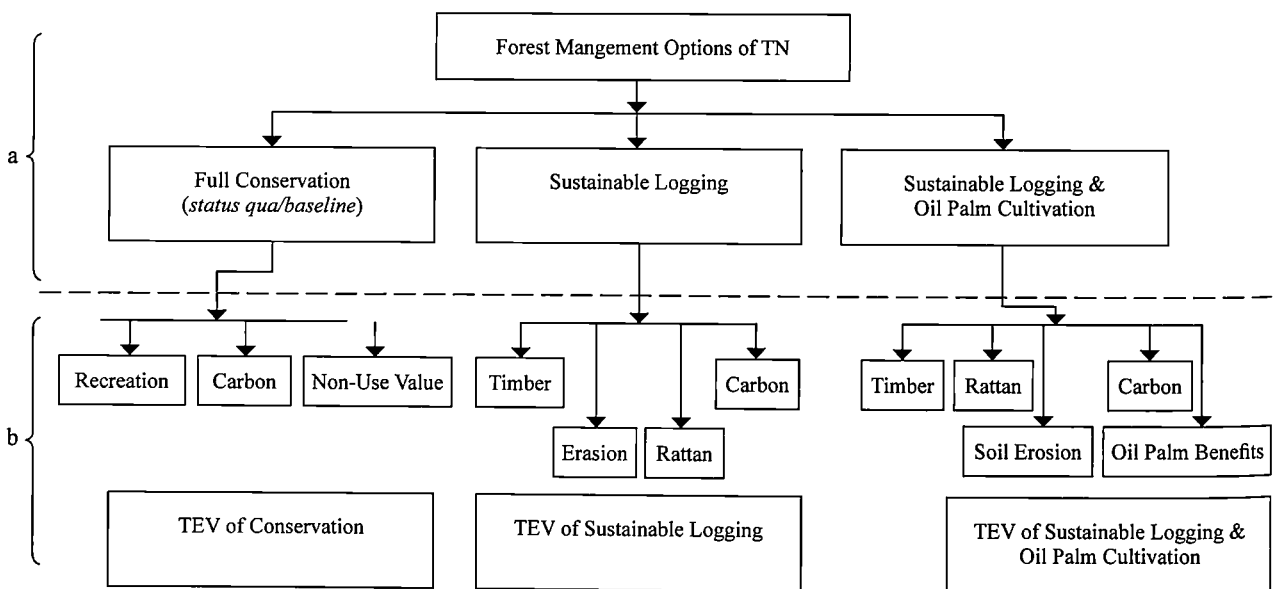


FIGURE 2. Forest Management Options for Taman Negara

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