# TOTAL FACTOR PRODUCTIVITY AND CROSS-BORDER FDI FLOWS IN OECD COUNTRIES - A PANELDATA ECONOMETRIC ANALYSIS*

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## Abstract

The role of FDI inflows and outflows to host countries and from the source countries emerged in the 1980s as the major vehicle technology transfer that accelerated the globalization or international integration of 25 leading OECD economies over a period of 25 years (1983-2007). Although neoclassical and endogenous growth theories provide unequivocal support for FDI flows because they generate positive externalities or spillover effects through channels of GDP growth, capital formation and R&D, the empirical evidence in support of these claims are mixed. The panel data econometrics performed using a new multiplicatively complete index of total factor productivity provide fresh insights on the cross-border FDI generated through technology transfer and other channels. The empirical findings for the OECD countries are markedly different from the spillover effects on developing countries that are plagued by technology absorptive capacity effects due to the operation of threshold effects of underdeveloped human capital resources. The empirics on cross-border FDI flows and the spillover effects that they generate in OECD countries will provide much needed information to design and implement policies to harness the net benefits from cross-border FDI flows and shed light on the design of policies to reconcile the conflicting policies of austerity and growth that are required to prevent the sovereign debt racked euro-zone countries from imploding the single currency union based on the euro.

Keywords: FDI . Externalities. Panel Data Econometrics. OECD. Euro.

JEL: O11, O40, F21, F23

**Abbreviations**

| | |
|---|---|
| ABS | Australian Bureau of Statistics |
| ADF | Augmented Dickey Fuller |
| AIC | Akaike Information Criterion |
| CPI | Consumer Price Index |
| CRS | Constant Returns to Scale |
| DW | Durbin Watson |
| FDI | Foreign Direct Investment |
| FE | Fixed Effects |
| FGLS | Feasible Generalized Least Squares |
| GDP | Gross Domestic Product |
| GERD | Gross Expenditure on R&D |
| GLS | Generalized Least Squares |
| ICT | Information and Communication Technology |
| IMF | International Monetary Fund |
| IPD | Implicit Price Deflator |
| ISIC | International Standard Industrial Classification |
| KPSS | Kwiatowski, Phillips, Schmidt and Shin |
| MFP | Mutlifactor productivity |
| MNCs | Multinational Corporations |
| OECD | Organization for Economic Co-operation & Development |
| OLS | Ordinary Least Squares |
| PC | Productivity Commission |
| PPP | Purchasing Power Parity |
| R&D | Research and Development |
| RE | Random Effects |
| TFP | Total Factor Productivity |

| | |
|---|---|
| TNC | Transnational corporation |
| UNCTAD | United Nations Conference on Trade and Development |
| VA | Value Added |
| WTO | World Trade Organization |

## 1. Introduction

The OECD economies are currently in the throes of a sovereign debt crisis that threatens wreck the euro zone or the common currency union that was established after the Maastricht treaty (1991). The euro zone economies, the PIGS (Portugal, Italy, Greece and Spain) are hovering on the brink of insolvency due to their inability to service their sovereign debt and contain their deficits without a massive bail out form the European Central Bank and the IMF. The strategies to steer the break-up the euro zone advocate the implementation of polices of austerity (spending cuts) on the one hand and growth on the other in the debt ravage OECD countries.

This paper presents empirics on how to reconcile policies of austerity, which is code for increase in Total Factor Productivity (TFP) with growth, which is code for increasing cross-border FDI. The impending implosion of the euro zone requires the implementation of massive structural adjustment in the shape of tax-payer funded bailouts to recapitalize banks in the PIGS. The failure to do so would lead to the break-up of the single currency union or the euro zone with the resulting crisis contagion not only adversely affecting the economies of the OECD but also the global economy.

The cross-border transfer and diffusion of technology through Foreign Direct Investment(FDI) under the aegis of Multinational Corporations (MNCs) has been a major force in the globalization or linking of the OECD more rapidly with the international economy during the study period 1983-2007. The nexus between cross-border FDI flows and the acceleration of GDP growth has been the subject of intensive research and heated debate over in recent decades. Both neoclassical economic theory and endogenous or new growth theory lend unequivocal support to the proposition that FDI flows are vehicles of cross-border transfer of technology that accelerates productivity and potential growth in both the host and source countries. However, empirical studies fail to match the hype of economic theory and an acrimonious debate has raged between supporters of increased FDI flows and those opposed to such increases on the basis diverse grounds that range from environmental pollution to the undermining of national interest and economic independence.

The literature survey undertaken for this study clearly reveal that despite the overwhelming theoretical support for cross-border FDI flows on the grounds that they are vehicle for transfer of technology and act as the motor of productivity and GDP growth by generating benign technological externalities or spillover effects the empirical evidence in support of these claims are at best mixed. In this paper, we identify some of the grounds for this skepticism and provide empirical evidence based on panel data econometrics to shed light on the nexus between FDI and TFP by generating empirical information on a number of fronts. First, the failure of the FDI flows, GDP and TFP growth to live up to the theoretical hype is examined, and its genesis due to the methodological flaws mired past studies is addressed. In this regard a major flaw in the use of OLS estimates based on pooled cross-section time series is the failure to take remedial measures to overcome the problems associated with parameter heterogeneity, outliers, omitted variables, model uncertainty, measurement error and endogeneity, low power of statistical tests that sap the reliability out of the empirics churned out by these methods . In this paper, we attempt to overcome these deficiencies by applying panel data econometric techniques. Second, much of the theoretical and empirical analysis relating to the FDI flows has focused on the externalities or spillover effects associated with the resulting GDP growth. However, in this paper argue that the focus should be directly on the nexus between TFP growth and FDI flows rather than on GDP growth. Second, in order to analyze more incisively the technological spillovers generated by TFP growth due to FDI flows the paper reports for the first by any study the empirical results related to the computation of multiplicatively complete TFP indexes that can FDI related TFP into technological spillovers effects that can be measured in the shape of scale economies, technical efficiency and technological change. Third, the paper unlike many earlier studies advances the knowledge frontier on the TFP-FDI empirics by considering both the crowding- out and crowding- in effects of cross-border, FDI flows on both the host country and the source country domestic investments and industries. These positive or negative spillover effects from the cross-border MNC- FDI flows that may be driven by the pecuniary motives of lowering production costs by vertical integration or by the motive to access to new markets through horizontal integration are reviewed. Fourth, the empirical analysis undertaken in this paper recognizes that the level of human capital and institutional fabric may impose constraints on the absorptive capacity of technology transferred by FDI to generate positive technological spillover effects on the host or source country. In particular we recognize that absorptive capacity for technology transferred by FDI is vastly different from that prevailing in developing countries hamstrung by poor infrastructure, lack of sound banking and financial institutions, law and order and a business friendly environment.. The empirical analysis undertaken in this study has used the most up-to-date panel dataset for 25 OECD countries over the span of 25 years (1983-2007) . The panel data set has been sourced from the most authoritative databases available from international organizations like the OECD, UNCTAD, World Bank and independent sources such as the Penn World Tables.

It is worthwhile recapitulating the contributions that the paper claims to make in advancing the knowledge frontier on the FDI-TFP empirics and on at least five fronts: i. We have refocused attention on the TFP linked spillover effects in this study rather than on the more indirect GDP related spillover effects that has been the focus of most empirical studies on FDI flows undertaken hitherto. ii. We contribute to the advancement on the knowledge frontier on cross-border MNC-FDI flows by analyzing spillover using for the first time a multiplicatively complete index, which enables the decomposition o of technological change due to FDI flows into measurable spillover effects in the form of scale economies and technical efficiency. iv. The empirical results reported in this paper are fully cognizant of the consequences of the divergence in the absorptive capacity in host and source countries for metabolizing and generating spillover effects. In particular developing countries lack the human capital, infrastructure , banking and financial institutions and business ethos that gives OECD countries a head start over developing countries in attracting MNC-FDI flows. iv. The empirical results of the study have taken account of both the crowding-in and crowding-effects on domestic firms of both FDI inflows and outflows in a symmetric manner unlike many other studies that have focused only on one side of the coin .v. Finally we have compiled the most up-to-date and comprehensive panel database from the most authoritative international and national databases that have been published to-date .

The stylized facts reported in Table 1 indicate that over the past three decades since the 1980s world FDI outward stocks and inward stocks have increased more than 25-fold and 30-fold, respectively. The growth of both inward and outward FDI stocks for the world has outstripped the growth rates of GDP and exports after registering temporary drops during the Asian Financial Crisis (1997) and the Global Financial Crisis (2007). It is noteworthy that for advanced countries, FDI flows exceeded the growth rates of GDP and exports and these strong growth trends are likely to continue into the foreseeable future. Although the Asian Financial Crisis (1997) and the Global Financial Crisis (2007) caused a dent in the inward and outward stocks of FDI, the stylized facts reported in Table 1 show that bi-directional flows have grown at phenomenal rate increase by more than ---over the two decades since 1980. The growth of FDI inward and outward flows exceeded the world growth rates of exports and GDP. These stylized facts indicate that FDI will continue to power the growth of productivity and growth in the world economy. Policymakers in both developed and developing countries have re-designed policies to attract FDI flows. An index of national regulatory changes compiled from survey data from the World Investment Report (UNCTAD) show that over the 15 years (1992-2006) 80 percent of regulatory changes undertaken by policymakers in the global economy has been aimed at encouraging FDI flows to the host countries (Contessi and Weinberger 2009).

**TABLE 1 STYLISED FACTS ON INWARD & OUTWARD**

**FDI STOCKS (1980-2000) US$ Billion.**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | ECONOMY | | FDI | Stock | | Annual Growth Rates | | |
| **FDI Stock** | Developing economies | 299 | 524 | 1728 | 4893 | 5.8 | 12.7 | 12.3 |
| **Outward** | Developed economies | 401 | 1555 | 5653 | 12325 | 14.5 | 13.8 | 9.0 |
| | World | 700 | 2082 | 7442 | 17743 | 11.5 | 13.6 | 10.1 |
| **FDI Stock** | Developing economies | 72 | 145 | 863 | 2691 | 7.3 | 19.5 | 13.5 |
| **Inward** | Developed economies | 477 | 1941 | 7083 | 16011 | 15.1 | 13.8 | 9.5 |
| | World | 549 | 2086 | 7967 | 18982 | 14.3 | 14.3 | 10.1 |
| **GDP** | Developing economies | 2594 | 3956 | 6973 | 16606 | 4.3 | 5.8 | 10.1 |
| **Nominal** | Developed economies | 8297 | 11427 | 24720 | 38817 | 3.3 | 8.0 | 5.1 |
| | World | 11897 | 22262 | 32089 | 57193 | 6.5 | 3.7 | 6.6 |
| **Exports** | Developing economies | 670 | 996 | 2404 | 5811 | 4.0 | 9.2 | 10.3 |
| | Developed economies | 1663 | 3189 | 5393 | 9452 | 6.7 | 5.4 | 6.4 |
| | World | 2424 | 4311 | 7975 | 15834 | 5.9 | 6.3 | 7.9 |

Source: UNCTADSTAT (2010) UNCTAD

Attracting FDI has been a major plank of national development strategies in both developed and developing economies. At national level there are strategies to reduce entry barriers (protection) and offer incentives to FDI (tax-holidays). Table 2 below reports the strong trends in the increase in OECD inflows and outflows during the 14 year period (1995-2008) in most OECD countries is shown below. USA recorded an inflow of more than 5 fold , nearly 5-fold Australia nearly 4 fold. The outflow of FDI during the 14 year period was more than 3-fold for USA and more than a 10-fold for Australia. FDI flows are likely continue to increase the stock of domestic capital in most FDI during the next decade and is likely to play a pivotal role in increasing productivity and growth in OECD economies.

**Table 2 Trends in FDI Inflows & Outflows - OECD (1995-2008) $US bn.**

| FDI | Inflow | %Change | | Outflow | %Change | |
|---|---|---|---|---|---|---|
| Years | 1995 | 2008 | 1995-2008 | 1995 | 2008 | 1995-2008 |
| Australia | 12.0 | 46.6 | 389.2 | 3.3 | 35.8 | 1090.2 |
| Austria | 1.9 | 13.5 | 710.3 | 1.1 | 28.2 | 2489.7 |
| Belgium | | 59.6 | | | 68.1 | |
| Canada | 9.3 | 44.7 | 482.9 | 11.5 | 77.6 | 677.2 |
| Denmark | 4.2 | 10.7 | 256.2 | 3.1 | 27.3 | 891.3 |
| Finland | 1.1 | -4.2 | -394.4 | 1.5 | 1.6 | 108.6 |
| France | 23.7 | 97.0 | 409.6 | 15.8 | 200.0 | 1269.0 |
| Germany | 12.0 | 24.9 | 207.0 | 39.1 | 156.2 | 399.9 |
| Greece | 1.2 | 5.1 | 424.3 | | 2.6 | |
| Iceland | 0.0 | -0.4 | -4211.1 | 0.0 | -8.1 | -32400.0 |
| Ireland | 1.4 | -12.3 | -851.5 | 0.8 | 13.2 | 1610.0 |
| Italy | 4.8 | 17.0 | 353.0 | 5.7 | 43.8 | 763.5 |
| Japan | 0.0 | 24.4 | | 22.6 | 128.0 | 565.6 |
| Korea | 1.8 | 2.2 | 123.9 | 3.6 | 12.8 | 360.2 |
| Mexico | 9.7 | 22.0 | 226.8 | | 0.7 | |
| Netherlands | 12.3 | -9.1 | -73.6 | 20.2 | 53.1 | 263.3 |
| New Zealand | 2.9 | 2.0 | 69.3 | 1.8 | 0.1 | 5.6 |
| Norway | 2.4 | -0.1 | -3.9 | 2.9 | 28.1 | 983.3 |
| Portugal | 0.7 | 3.5 | 534.1 | 0.7 | 2.1 | 306.9 |
| Spain | 6.3 | 65.4 | 1040.8 | 4.2 | 77.2 | 1855.9 |
| Sweden | 14.4 | 40.4 | 279.6 | 11.2 | 40.2 | 358.4 |
| Switzerland | 2.2 | 17.4 | 782.7 | 12.2 | 86.3 | 706.2 |
| Turkey | 0.9 | 18.2 | 2053.2 | 0.1 | 2.6 | 2287.6 |
| United Kingdom | 20.0 | 96.0 | 480.6 | 43.6 | 110.4 | 253.5 |
| United States | 57.8 | 319.7 | 553.4 | 98.8 | 332.0 | 336.2 |
| OECD 25 total | 201.8 | 908.4 | 450.2 | 302.0 | 1518.1 | 502.7 |
| % of total | 89.6 | 89.0 | 99.3 | 95.7 | 93.1 | 97.2 |

Sources: OECD Factbook 2010: Economic, Environmental and Social Statistics

OECD 2010

The rest of the paper is organized as follows: Section 2 presents an annotated literature review on the role played by FDI in generating TFP and growth through net positive spillover effects or positive externalities. Section 3 outlines the methodology used in this paper to measure a multiplicatively complete index of TFP that is decomposable into components of technical change and various measures of technical efficiency that can act proxy measures of technological spillover effects due to FDI. Section 4 outlines the methodology of panel data econometrics that has been deployed in this study to measure the link between changes in TFP and FDI in the context of other major explanatory and controlling variables governing the economies of the panel of OECD countries studied in this paper. Section 5 presents the key empirical findings that link TFP changes to cross-border FDI flows subject to openness, R&D, capital formation and control variables due to policy effects of inflation and government spending and business cycle effects. Section 6 concludes the paper offering some policy perspectives.

## 2. Literature Review

The importance of increasing total factor productivity  or output as ratio of the various factor input is widely recognized to be a  key determinant of a nation's growth and enhancement of the living standards of its populace as underscored in the quotes of several eminent economists:

"Productivity… in the long run it is almost everything." (Krugman, 1994).

"Nothing contributes more to reduction of poverty..", than productivity (Blinder, 1993)

"Productivity is the prime determinant in the long run of a nation's standard of living. " (Porter, 1991).

The empirical literature on the measurement of productivity identifies as a core indicator increase in per capita GDP as a measure of improvement a country's living standards due to technical progress. The literature identifies technological change as an important determinant of growth and productive externalities. Neoclassical growth theory identified exogenous technical progress as an important driver of growth (Solow, 1956). Endogenous growth models ascribe an important role to technological change for achieving perpetual or sustainable economic growth (Romer, 1990). These growth theories haves have identified two important channels through which FDI transfers technological change across borders. The first channel, known as the diffusion channel plays a catalytic role in advance countries by generating productivity externalities through the transfer x-efficiency (i.e. managerial, marketing, product and process innovation, and access to markets and adaptation of advance country technologies) according to (Coe, 1995, Grossman, 1991, De Mello., 1997). The second channel through which FDI transfers technology is known as the absorption channel and plays a significant role in increasing productivity and growth in the host country by facilitating the absorption, adaptation, imitation , 'learning- by- doing' and reverse engineering of new technology innovated in advance countries i(Coe, 1995, Savvides, 2005)

In this paper, we regard the increase in nation's TFP as the major fulcrum that generates positive externalities or spillover effects due to the cross-border transfer of technology via FDI.

The major bone of contention is whether inward FDI stocks complements (crowds-in) or substitutes (crowds-out) domestic investment. The crowding-in hypothesis contends that FDI inward stocks alters the ownership structure of domestic investment and provides additional capital, technological know-how, R&D that stimulates product and process innovation, provides access to overseas marketing net works – and thus increases the profitability of domestic investors. On the contrary, the crowding-out hypothesis contends that FDI inward stocks reduces the market share of domestic firms, decreases profitability and drives domestic firms to the wall. Below, we list the arguments that have been advanced by the proponents of the crowding-in and crowding-out hypothesis based on a selective survey of the literature.

The proponents of the crowding-in hypothesis assert that FDI inflows causes domestic firms in the host country to: i. Increase their investment in the domestic firms in order to meet the competitive challenges posed by FDI (De Mello, 1999). ii. FDI inflows could increase investment in infrastructure (transport and telecommunication) (Cardoso and Dornbusch, 1989). iii.  FDI brings in its train the firm specific assets that promote  innovation of new products and processes (Herzer, 2008) (Blomström M., 1998). iv. FDI will increase demands for host country factor inputs (capital and labour). v.  FDI will create agglomeration economies that attract more foreign investors and increase complementarities to host country firm(Markusen J R and Venables A J., 1998) The operation of the crowding-hypothesis is conditional on the host country attaining threshold levels of human capital development (Carkovic. M. and Levine. R. , 2009, Borensztein, 1998) , degree of openness to trade (Balasubramanyam, 1996, Bhagwati, 1978), level of financial sector development (Alfaro, 2004)

The proponents of the crowding-out hypothesis associate a number of adverse effects with FDI inward stocks.  i.  The technological superiority of FDI gives them an advantage over domestic firms to exploit profitable investment opportunities that arise ( (Fry M.J., 1992, Agosin M. R. and Mayer R., 2000).(Kokko A., 1994). ii. Under conditions of imperfect competition the advent of FDI in the host country could reduce the market share of domestic firms and drive them to the wall due to reduce profitability (Kokko A., 1994). iii. Domestic investment has no crowding out effects on domestic investments by increasing imports and causing a worsening of the terms of trade increases in the current account and balance of payments deficits(Stevens, 1992).iv. FDI can also crowd-out domestic firms because of the inability  of domestic firms to compete successfully with MNCs and their affiliates and subsidiaries  for the limited credit and financial resources that are available to a host nation

(Apergis N. Katrakilidis C. and Tabakis M., 2006). The openness to trade and investment through trade liberalisation does not appear to have crowding out effects on domestic investment according to studies by (Harrison(Harrison A. and Revenga A., 1995).

The crowding-in and crowding-out effects of FDI operate through a complex matrix of channels giving results that diverge from theoretical predictions and intuition of the policymakers. Therefore, whether FDI inflows can through net crowding-in effects can generate positive externalities in the host or source country has to be resolved by empirical analysis(Desai and . 2005).. A task, which we address in the next section.

FDI by MNCs are motivated by the objective of lowering production costs either by vertical integration abroad or through access to new markets through horizontal integration. The positive negative spillover effects from these different types of integration vary according to the degree of FDI competition with domestic firms and market share in the host economy (Arndt, 2010). Cross-country regressions empirics performed at the macro-level indicate that technology transfer by FDI flows have different types of growth and productivity externalities in advanced and developing countries. In developing countries for technology transfer through FDI to ignite positive growth and productivity externalities it is imperative that the developing country should have attained a critical threshold level of human capital development, well functioning capital markets and open or liberal trading regimes to have the absorptive capacity to benefit from the technology transferred by FDI (Carkovic, 2009, Borensztein, 1998, Xu, 2000a, Carkovic. M. and Levine. R. , 2009) . Some cross-country regression studies demonstrate that technology transfer through FDI flows generate positive externalities in host countries even if there is no strong absorptive capacity due to the absence of a developed human capital threshold (Khawar, 2005). Some cross-country regression studies based on developing countries demonstrate that openness to trade through the implementation of export oriented industrialization strategies rather than inward looking import substituting industrialization strategies are crucial for the positive growth and productivity externalities for technology transfer through FDI flows to occur(Balasubramanyam, 1996, Xu, 2000b) However, allowing unfettered technology transfer through FDI by removing capital controls before the establishment of a sound financial and banking system could lead to moral hazard outcomes due to the absence of prudential supervision of FDI flows rendering the host country vulnerable to financial crises due to 'sudden stops' of capital flows due to panic behavior by foreign investors (Bhagwati, 1978, Stiglitz, 2009)

The above literature review clearly establishes the case to analyze the effects of FDI flows on advanced countries separately from those of developing countries as they are subject to different human capital and financial structure threshold effects. Furthermore, the importance of analyzing the effects of spillover effects of FDI flows by focusing on components of total factor productivity rather than GDP growth is more insightful and provides useful guidelines for policymakers confronted with task of designing policies for regulating the inflow and outflow of FDI flows in a manner consistent with national interest.

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The literature of the empirical effects o cross-border net FDI inflows are shrouded in ambiguity and therefore rigorous empirical analysis is required to shed light on the complex dynamics linking cross-border FDI flows and the TFP related spillover effects they generate.

## 3. The Measurement of Total Factor Productivity (TFP)

It is our contention that the direct measurement of TFP and externalities or spillover effects due FDI inward or outward stocks provide a more incisive measure of externalities than that provided by the use of GDP growth as in most empirical studies undertaken on the subject to date. The measurement of TFP poses formidable challenges and much of the neoclassical growth literature use growth accounting to obtain TFP as a residual from by rearranging components of a Cobb-Douglas , Translog of CES production function. The ‘Solow residual’ obtain from the Cobb-Douglas production function (Solow, 1956) is used to measure TFP and some critics regard it as an “an index of ignorance” although Solow popularised this as a measure of the unobserved component as a measure of TFP or exogenous technological progress. In this study, we break new ground by measuring TFP using a multiplicatively complete index number to measure TFP. A multiplicatively complete index number enables the decomposition of measures of TFP into components of technical change and several measures of technical efficiency as hypothesised by (O'Donell CJ., 2009, O'Donell, 2008). In this study, we argue that these components provide proxy measures of technological spillover associated with FDI cross-border flows.

The methodology used in this study to measure TFP assumes that TFP resulting FDI flows into a country in period t is a ratio of aggregate output ($Q_t$) to aggregate input ($X_t$) defined by:

$$TFP_t = Q_t/X_t \qquad (1)$$

The by computing the ratio defined below TFP growth from period 0 to period t for a given country in terms of an index number:

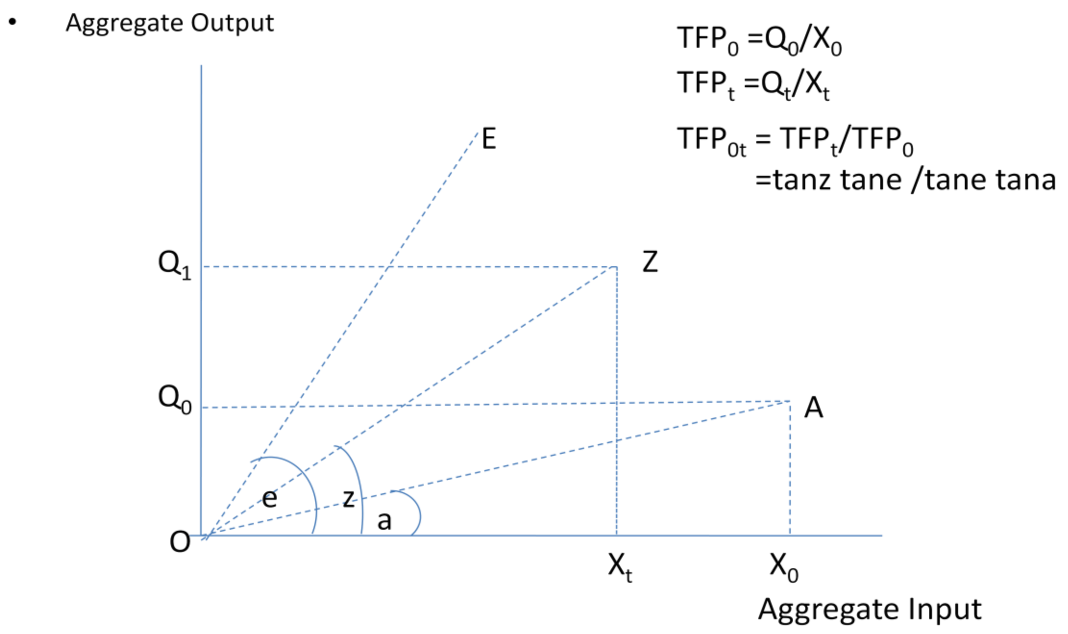
$$TFP_{0t} = Q_{0t}/X_{0t} \qquad (2)$$

The TFP index number defined above satisfies the properties of *multiplicative completeness* and therefore lends itself to decomposition to components of technical change ( (O'Donell CJ., 2009). The components can be used to measure important technological spillover effects generated by FDI flows that have eluded rigorous quantification so far. The decomposition of the TFP index into input-oriented components of technical change can be explained following O'Donnell, in Figure 1 in the input-output or X-Q space. In the Figure the change in TFP from period 0 and period t is depicted by a change in the slopes of the rays that pass through the origin at point A and Z, shown by the angles and marked by the lower case letters a and z . The index that measures the change in TFP between period 0 and 1 for a given country can be defined by the ratio of the angles or the tangents as shown below, where tane represents TFP at some non-negative point E on the X-Q space:

$TFP_{0t}$ = (tanz/tane) /(tane/tana) (3)

The equation (3) demonstrates that an index of TFP that can be expressed in terms of ratios of output and input changes can be decomposed into several input-oriented decompositions that also double up measures of spillover effects. The input-oriented decomposition measures have also output oriented counterparts, which have similar interpretation and meaning.

# Figure 1. Measuring and Decomposing TFP change




Movements from point A to a point E in Figure 1 measures TFP efficiency (TEFP) or the gap between technology used by a country and the best practice technology frontier or maximum potential TFP that that is available in period 0 and defined by $TFP_0^*$. The measure of TFP efficiency, which can be factorized into different input-oriented components as shown below:

$TFPE_0 = TFP_0 / TFP_0^* = ITE_0 \times ISE_0 \times RME_0$ (4) where,

*ITE: Input–oriented technical efficiency* = the difference between observed TFP and the maximum possible TFP given fixed input-mix, output-mix and output levels.

*ISE: Input –oriented scale efficiency* = difference between TFP at a technically efficient point and the maximum possible TFP while letting output vary given fixed input and output mixes.

*Residual Mix Efficiency* (RME) = difference between TFP at a point on a mix restricted frontier and the maximum TFP possible when input and output mixes and levels) are variable.

A measure of TFP efficiency for period 1 or $TFPE_1$ can be decomposed in a manner analogous to that given in equation (4) and the ratio of the two decompositions enables the specification of a multiplicatively complete index of TFP change between period 0 and 1 as shown below:

$$TFP_{0t} = TFP_t / TFP_0 = [TFP_t/TFP_0^*] \text{ x } [ ITE_t/ITE_0 \text{ x } ISE_t/ISE_0 \text{ x } RME_t/RME_0 ] \quad (5)$$

In equation (5) the first term within parenthesis on the right hand side measures technical change and is given by the ratio of the difference between the maximum potential TFP that can be generated using technology available in period t and the period 0, respectively. The other ratios measure technical efficiency change, scale efficiency change and residual mix that occur between period 0 and t. The input oriented measures of technical change have output-oriented counterparts that have similar interpretations. The DPIN Software based on non-parametric data envelope analysis (DEA) written by (O'Donell CJ., 2009) has been used in this study to decompose the multiplicatively complete using the Moorsteen-Bjurek TFP index and the results are reported in Table 3. Several other index numbers satisfy the properties of multiplicative completeness that facilitates the decomposition of TFP changes based in meaningful components of technical change and technical efficiency that also can be interpreted as spillover effect measures. The other index numbers that satisfy the properties of multiplicative completeness include, Laspeyres, Paasche, Fisher Ideal, Tornquist, Hicks-Moorsteen indexes. However, it is noteworthy that widely used Malmquist index popularized by(Caves, 1982) fails to satisfy the properties of multiplicative completeness and therefore cannot be used in the analysis of spillover effects due to technological change caused by FDI flows. The DPIN software also provides estimate of the decomposition of both input and output oriented technical, scale and mix-efficiency and also measures of components of TFP change are reported in Table 3 and Table 4 respectively and are given below:

**TABLE 3 MEASURES OF TECHNICAL, SCALE & MIX EFFICIENCY**

| Year | Obs | | Country | Scores | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| t | i | n | | OTE | OSE | OME | ITE | ISE | IME |
| 1982 | 26 | 1 | Australia | 0.71 | 1 | 1 | 0.71 | 1 | 0.73 |
| 1982 | 29 | 4 | Canada | 0.64 | 1 | 1 | 0.64 | 1 | 0.59 |
| 1982 | 42 | 17 | NZ | 0.49 | 1 | 1 | 0.49 | 1 | 0.61 |
| 1982 | 49 | 24 | UK | 0.53 | 1 | 1 | 0.53 | 1 | 0.51 |
| 1982 | 50 | 25 | USA | 0.65 | 1 | 1 | 0.65 | 1 | 0.62 |
| 1992 | 276 | 1 | Australia | 0.41 | 1 | 1 | 0.41 | 1 | 0.89 |
| 1992 | 279 | 4 | Canada | 0.29 | 1 | 1 | 0.29 | 1 | 0.77 |
| 1992 | 292 | 17 | NZ | 0.58 | 1 | 1 | 0.58 | 1 | 0.94 |
| 1992 | 299 | 24 | UK | 0.47 | 1 | 1 | 0.47 | 1 | 0.99 |
| 1992 | 300 | 25 | USA | 0.6 | 1 | 1 | 0.6 | 1 | 0.94 |
| 2002 | 526 | 1 | Australia | 0.32 | 1 | 1 | 0.32 | 1 | 0.89 |
| 2002 | 529 | 4 | Canada | 0.24 | 1 | 1 | 0.24 | 1 | 0.75 |
| 2002 | 542 | 17 | New Zealand | 0.53 | 1 | 1 | 0.53 | 1 | 0.98 |
| 2002 | 549 | 24 | UK | 0.6 | 1 | 1 | 0.6 | 1 | 1 |
| 2002 | 550 | 25 | USA | 0.59 | 1 | 1 | 0.59 | 1 | 0.96 |
| 2007 | 651 | 1 | Australia | 0.02 | 1 | 1 | 0.02 | 1 | 0.56 |
| 2007 | 654 | 4 | Canada | 0.02 | 1 | 1 | 0.02 | 1 | 0.31 |
| 2007 | 667 | 17 | NZ | 0.02 | 1 | 1 | 0.02 | 1 | 0.83 |
| 2007 | 674 | 24 | UK | 0.02 | 1 | 1 | 0.02 | 1 | 0.92 |

**TABLE 4 DECOMPOSITION OF CHANGES IN TFP SPILLOVER EFFECTS**

| Year t | Obs I | N | Country | TFP score | dTech y | dEff | dOTE | dOSE | dOME |
|---|---|---|---|---|---|---|---|---|---|
| 1982 | 26 | 1 | Australia | 1 | 1 | 1 | 1 | 1 | 1 |
| 1982 | 29 | 4 | Canada | 0.87 | 1 | 0.87 | 0.84 | 1 | 1 |
| 1982 | 42 | 17 | NZ | 0.65 | 1 | 0.65 | 0.64 | 1 | 1 |
| 1982 | 49 | 24 | UK | 0.66 | 1 | 0.66 | 0.53 | 1 | 1 |
| 1982 | 50 | 25 | USA | 0.74 | 1 | 0.74 | 0.73 | 1 | 1 |
| 1992 | 276 | 1 | Australia | 1 | 1 | 1 | 1 | 1 | 1 |
| 1992 | 279 | 4 | Canada | 1.1 | 1 | 1.1 | 1.1 | 1 | 1 |
| 1992 | 292 | 17 | NZ | 1.06 | 1 | 1.06 | 1.06 | 1 | 1 |
| 1992 | 299 | 24 | UK | 0.97 | 1 | 0.97 | 0.97 | 1 | 1 |
| 1992 | 300 | 25 | USA | 1.09 | 1 | 1.09 | 1.09 | 1 | 1 |
| 2002 | 526 | 1 | Australia | 0.95 | 1 | 0.95 | 0.92 | 1 | 1 |
| 2002 | 529 | 4 | Canada | 0.93 | 1 | 0.93 | 0.92 | 1 | 1 |
| 2002 | 542 | 17 | New Zealand | 1.1 | 1 | 1.09 | 1.1 | 1 | 1 |
| 2002 | 549 | 24 | UK | 1.06 | 1 | 1.06 | 1.03 | 1 | 1 |
| 2002 | 550 | 25 | USA | 0.95 | 1 | 0.95 | 0.92 | 1 | 1 |
| 2007 | 651 | 1 | Australia | 1 | 1 | 1 | 1 | 1 | 1 |
| 2007 | 654 | 4 | Canada | 0.94 | 1 | 0.94 | 0.94 | 1 | 1 |
| 2007 | 667 | 17 | N Z | 0.92 | 1 | 0.92 | 0.92 | 1 | 1 |
| 2007 | 674 | 24 | UK | 0.81 | 1 | 0.81 | 0.81 | 1 | 1 |
| 2007 | 675 | 25 | USA | 0.89 | 1 | 0.89 | 0.89 | 1 | 1 |

## 4. Panel data econometrics

Panel data econometrics used in this paper incorporate unit root and cointegration tests that overcomes the bias and inconsistency problems vitiating OLS estimators computed from pooled cross-section time-series data by addressing a number of limitations by: i. The identification of parameters of crucial FDI-TFP relationships without imposing too many restrictive assumptions. ii The computation of more efficient estimators than those provided by pure time-series or cross-section datasets or any combination of them using the same sample size (Njman and Verbeek 1990).iii. Providing insights on the ’ true state dependence’ and ‘spurious state dependence’ based on history of individual observations(Heckman, 1978). iv. Reducing the bias due to omitted variables that arises due to the undermining of the assumption that explanatory variables are uncorrelated with the error term (Mundlak, 1961) v. Identifying valid internal instruments for regressors that are affected by measurement error, where the transformed original variable transformed into a variable that is correlated with explanatory variables in the model but uncorrelated with the error term. The advantages of panel data econometrics are also critically surveyed by (Hsiao, 2003) and (Baltagi, 2005) and others.

Panel unit root tests

Panel unit root tests are the multiple series analogue of unit root tests of a univariate series. Panel unit root tests than their univarate counterparts. The panel unit root tests can be classified based on restrictions on the autoregressive process across cross-sections or series. If the AR(1) process for panel data is given by :

$y_{it} = \rho_i y_{it-1} + X_{it}\delta_i + \epsilon_{it}$

$X_{it}$: exogenous variables including fixed effects or individual trends

where $i = 1, \dots, N$ number of cross − sections, T $t = 1, .. T$ number of time − periods

$\rho_i$: autoregressive coefficients, $\epsilon_{it}$: iid idiyosyncratic error terms

. If $|\rho_i| = 1$ then $y_i$ has a unit root and if $\rho_i < 1$ *then is weakly trned stationry.*

We report in this paper the unit root tests due to(Levin, 2002) or LLC , (Im, 2003) or IPS which are panel unit root analogues of the Phillips-Perron (PP) and Augmented Dickey Fuller (ADF) tests . We also report the results for the Hadri test (Hadri, 2000) which tests the null of stationarity against the alternative in a panel setting in a manner analogous to the KPSS test in the univariate case. Furthermore, the Maddala and Wu (1999) MWa panel unit root test is based on the combination of the p-values of i cross-section unit root tests using a Fisher

(1932) index. Here i= 1….N , cross-sections and $p_i$ are the p-value of the i-th cross-section. The resulting non-parametric MW tests could be computed using the Augmented Dickey Fuller (ADF) or Phillips-Perron (PP) statistic which defined by $P(\lambda) = -2\sum_{i=1}^{N}\log(p_i) \sim \chi^2$ ($2^{Nd}$.f). A detailed description of these statistics is given in the EVIEWS 7.1Manual.

Panel cointegration tests

Panel cointegration tests estimate the long-run equilibrium relationship between the TFP and FDI variables of interest. The Engle-Granger Representation theorem (Engle and Granger 1987) postulates if the variables of interest are integrated order one I(1) and if the residuals of the regression which specifies a linear combination of the variables of interest are stationary or I(0) , then the variables of interest are cointegrated.

The methodology enunciated by (Pedroni, 1999) is invoked to implement cointegration tests or tests for long-run equilibrium relationships among the major variables linking total factor productivity and FDI and other major economic variab.es.. The Pedroni methodology which is analogous to follows the Engle-Granger two-step procedure in the univariate case, allows for the testing for the presence of heterogenous slope coefficients, fixed effects and individual specific deterministic trends in the cointegration equation (1) as exemplified below:.

$$y_{it} = \alpha_i + \sum_{j=1}^{m}\beta_{jt}\,x_{jt} + \varepsilon_{it} \qquad (1)$$

$t = 1, \dots T$ (number of observations); $i = 1, \dots N$(number of countries); $m = 1, .. M$ .

$\alpha_i$: intercepts or fixed efects terms , $\beta_{1i}, \ldots, \beta_{mi}$: m slope coefficients.

$\delta_i t$: deterministic time trendss.

Where the residuals estimated from the panel regression equation (1) follows the AR-process given in equation (2), where testing for cointegration is a test of whether the null-hypothesis $H_0$: $\rho_i$=1 for all i in the equation (2) below:

$$\varepsilon_{it} = \rho_i \varepsilon_{i,t-1} + \varsigma_{it} \qquad (2)$$

Pedroni formulates seven statistics based on the residuals of the cointegration regression above.. The asymptotic distributions derived from these panel cointegration are used to derive critical values for the cointegration test statistics under standardizations , based on the moments of Brownian motion functions, which are distributed standard normal (Pedroni 1999: 660-661). The seven statistics formulated by Pedroni to test the null of no cointegration in heterogenous panels are classified into four “within-dimension” panel tests and three “between-dimension” group tests. The within-dimension tests take into account common time factors and allow for heterogeneity across countries. The between-dimension tests are group mean tests that take into account of heterogeneity of parameters across countries.

Granger causality tests

In order to test for the direction of causality between TFP and FDI variables we first estimate the variants of the panel cointegration equation (1) by applying the methodology of based on the Engle-Granger residual method as to panel data by Pedroni (2001). The estimated equations only reveal the existence or not of cointegrating relationships among the variables of interest. In order to determine the direction of causality between TFP and FDI we estimate bivariate Granger causality tests by imposing restrictions on coefficients defined in the set of equations (3) below:

$$\Delta(TFP_{it}) = \alpha_i + \sum_{k=1}^{p} \beta_{11}\, \Delta LOG(FDII_{it-k}) + \sum_{k=1}^{p} \beta_{12}\, \Delta LOG(FDIO_{it-k}) \ + \varepsilon\, 1_{it})$$

$$\Delta LOG(FDII_{it}) = \alpha_i + \textstyle\sum_{k=1}^{p} \beta_{11}\, \Delta(TFP_{it-k}) + \sum_{k=1}^{p} \beta_{12}\, \Delta LOG(FDIO_{it-k}) \ \ +\varepsilon 2_{it}) \qquad (3)$$

$$\Delta LOG(FDIO_{it}) = \alpha_i + \sum_{k=1}^{p} \beta_{11}\, \Delta LOG(FDII_{it-k}) + \sum_{k=1}^{p} \beta_{12}\, \Delta(TFP_{it-k}) \ \ +\varepsilon 3_{it})$$

The symbol Δ refers to the difference operator and k=1,..p refers to lag length based on Schwartz Information Criterion ( SIC). The null-hypothesis of FDII not Granger causing TFP and the reverse causality null are tested by imposing restrictions and testing for the joint null-hypothesis Ho: $\sum_{k=1}^{p} \beta_{11} = 0 \ \ for \ \forall \ i \ and \ k, \beta_{16} = 0$ using an F-test with the appropriate d.f.

Next, we describe the theory underpinning the empirical validation of a model describing the nexus between TFP and FDI and other macro-economic explanatory variables and control variables identified in the literature review as important influences that impinge on the TFP-FDI dynamics of the panel dataset under study in this paper.

Before, empirically validating the fully-fledged model we carry out the Hausman (1978) test to determine whether the model is best described by a Fixed Effect (FE) or Random Effect (RE) model. We can specify the static linear Fixed Effects model that explains the TFP of country i in year t given by $y_{it}$ as a linear regression framework. Where the intercept term $\alpha_i$ proxies the country specific or idiosyncratic fixed effects and the k explanatory variables and control variables (as detailed in Table 5 below) are defined by $x_{it}$ and $\mu_{it}$ the independently, identically distributed stochastic disturbance term with zero mean and constant variance as specified in (1) below:

$$y_{it} = \alpha_i + x_{it}^{'}\beta + \mu_{it}\ , \ \ \mu_{it} \sim IID\left(0, \sigma_{\mu}^2\right) \qquad (4)$$

The above equation could be re-written as OLS regression with dummy variables $d_{ij}$=1 if i=j or 0 otherwise, representing the idiosyncratic fixed effects ith- country described by the intercept term in (1), giving:

$$y_{it} = \sum_{j=1}^{N} a_j\ d_{ij} + x_{it}^{'}\beta + \mu_{it}\ , \qquad (6)$$

The estimates of the coefficients of the dummy variables d and the explanatory variables β can be obtained as the Least Squares Dummy Variable (LSDV) estimator by applying OLS method to equation (2). However, a less complicated method of obtaining the same estimates is through the application of OLS to after transforming equation (1) into the demeaned or mean deviation. This transformation produces observations that deviations from individual means and eliminates the fixed effects or the intercept term $\alpha_I$ . This transformation based on observations that deviate from the means is also referred to as the *within transformation* and the OLS estimator of β obtained from is defined as the the within estimator or fixed effects estimator is $\widehat{\beta}\, FE$. It is an unbiased and consistent estimator of β when the requirements for the FE model are satisfied. That is i. First, the explanatory variables $x_{it}$ should be uncorrelated with the idiosyncratic disturbance term $\mu_{it}$ .ii. Second, the explanatory variables, if strictly exogenous, should be independent of the past, current and future values of the idiosyncratic disturbance term.iii. Third, the error term should be homoscedastic.

The degrees of freedom (df) correction for obtaining the fixed effects estimator by applying pooled OLS to the time demeaned version of equation (1) we are dealing with a total of NT observations and k independent variables. For each cross-section or country i, we lose 1 df because of time-demeaning. Therefore, the appropriate df that should be used in tests of significance is NT – N –k = N(T-1)-k.

The focus in the FE model is on the differences 'within' individual countries, i.e. it explains to what extent $y_{it}$ differs from the mean of each country, but it does not explain why the mean of y differs across countries. The FE regression parameters explain effects that are identified only through the within dimension of the data.

The Random Effects (RE) Model

In regression analysis it is assumed that all the factors that affect the dependent variable that have been exclude are incorporated in the error term. This leads to the assumption that $\alpha_i$ are random factors that are i.i.d. over individual countries and enables the specification of the RE model as follows::

$$y_{it} = x_{it}^{'}\beta + \alpha_i + \mu_{it} \;, \quad \propto_i \sim IID(0, \sigma_\alpha^2) \;, \mu_{it} \sim IID\left(0, \sigma_\mu^2\right) \qquad (7)$$

where $\alpha_i + \mu_{it}$ is a composite error term comprising of an individual country specific component that a time-invariant component that is uncorrelated over time. Therefore, all the correlation over time is associated with the country specific effect $\alpha_i$ . Furthermore, since $a_i$ and $u_{it}$ are mutually independent of $x_{it}$ , the OLS estimates of the β parameters in (8) are unbiased and consistent. The composite error exhibits is subject to a particular form of autocorrelation and therefore estimators that are more efficient can be obtained by exploiting the structure of the error covariance matrix to obtain more GLS estimators of the regression parameters. The GLS transformation is captured in a parameter $\lambda$ that eliminates the serial correlation as described by complex matrix algebra (Wooldridge 1999, Chapter 10). The OLS pooled estimator is obtained when $\lambda$ =0 and the fixed effects (FE) estimator is obtained when $\lambda$= 1. When the estimated $\lambda$ is closer t unity he random effects(RE) model provides a more appropriate estimator than the FE model set out in the equations below:

$$\Delta(TFP_{it}) = \alpha_i + \sum_{k=1}^{p} \beta_{11}\,\Delta LOG(FDII_{it-k}) + \sum_{k=1}^{p} \beta_{12}\,\Delta LOG(FDIO_{it-k}) \;+ \varepsilon\, 1_{it})$$

$$\Delta LOG(FDII_{it}) = \alpha_i + \textstyle\sum_{k=1}^{p} \beta_{11}\,\Delta(TFP_{it-k}) + \sum_{k=1}^{p} \beta_{12}\,\Delta LOG(FDIO_{it-k}) \;+\varepsilon 2_{it}) \qquad (8)$$

$$\Delta LOG(FDIO_{it}) = \alpha_i + \sum_{k=1}^{p} \beta_{11}\,\Delta LOG(FDII_{it-k}) + \sum_{k=1}^{p} \beta_{12}\,\Delta(TFP_{it-k}) \;+\varepsilon 3_{it})$$

The symbol $\Delta$ refers to the difference operator and k=1,..p refers to lag length based on Schwartz Information Criterion (SIC). The null-hypothesis of FDII not Granger causing TFP and the reverse causality null are tested by imposing restrictions and testing for the joint null-hypothesis Ho: $\sum_{k=1}^{p} \beta_{11} = 0 \;\; for \;\forall\; i \; and \; k, \beta_{16} = 0$ using an F-test with the appropriate degree freedom.

## 5. Empirical results

The empirical results reported in this study are based on annual data from a sample of 25 OECD countries and aims to explain the total factor productivity (TFP) growth effect due to FDI inflows, FDI outflows estimated using the panel data econometrics as outlined in Section 3. We use FDI stocks rather than FDI flows, because stocks, due to accumulation of flows, capture the long run effects better than flows (Bitzer J and Gorg H., 2009).

**TABLE 5 PANEL DATA MODELLING VARIABLES & DATA SOURCES**

| Variable | Description | Source |
|---|---|---|
| $\Delta$LOG($TFP_{it}$) | Growth of TFP index | Database |
| LOG($GDP_{it}$) | GDP at constant 1990 prices & exchange rates | WDI |
| LOG($GDPPC_{it}$) | GDP per capita at constant 1990 prices & exchange rates | Database |
| $\Delta$LOG($FDII_{it}$) | Stock of Inward FDI | WDI |
| $\Delta$LOG($FDIO_{it}$) | Stock of outward FDI | WDI |
| $\Delta$LOG($OPEN_{it}$) | Trade in goods & non-factor services as a percent of GDP | WDI |
| $\Delta$LOG($GERD_{it}$) | Government expenditure on R&D | OECD Statistics |
| $INFL_{it}$ | Inflation measured by the change in the implicit price deflator | WDI |
| $\Delta$LOG($GOVX_{it}$) | Government expenditure | WDI |
| $\Delta$LOG($CAPF_{it}$) | Stock measure of capital formation | WDI |
| $\Delta$LOG($DEFL_{it}$) | GDP or the Implicit Price Deflator | WDI |
| $\Delta$(1-1/LOG($EMP_{it}$)) | Business Cycle Effect, $EMP_{it}$ : Total Annual Hours Worked | PWT 6.2 |
| CON_IDENTITY | Country identifier | Database |
| YEAR | Time identifier | Database |

Notes: $\Delta$: first difference operator. i = 1,….N (Countries), t =1,…..T (Years).

$\Delta$LOG(Variable) = Growth rate of the variable.

Sources: WDI – World Development Indicators, UNCTAD Handbook of Statistics 2009

PWT – Penn World Table 6.2. The Conference Board Total Economy Database.

Relates to the Database: See Appendix

In the empirical investigation, we test whether the major variables of interest relating to FDI inflows and outflows exhibit a long-run equilibrium or are cointegrated. Descriptive statistics on these variables or interest are reported in Table 6 below. Second, the results of the panel unit root tests on the major variables that govern the TFP-FDI nexus are reported in Table 7. Third, the results of Pedroni's heterogeneous panel cointegration tests to determine whether cointegaration or a long-run equilibrium relationship between TFP and FDI inflow and outflow variables are reported in Table 8. Fourth, in order to determine the direction of causality from TFP to FDI flows, thereby shedding light on whether the crowding-out or crowding in hypothesis is supported or not is reported in Table 9. Fifth, the tests on whether the fixed versus random effects models are presented in Table 10.. Thereafter, the results of the empirical validation of a fully-fledged model with several explanatory and control variables that govern the nexus between TFP and FDI for the panel of OECD countries is presented in Table 11.

**TABLE 6 DESCRIPTIVE STATISTICS ON TFP- FDI VARIABLES OF INTEREST**

| | (DTFP) | ΔLOG(FDII) | ΔLOG(FDIO) | ΔLOG(OPEN) | ΔLOG(GERD) | ΔLOG(CAPF) |
|---|---|---|---|---|---|---|
| Mean | 0.008191 | 0.006988 | 0.006118 | 5.88E-05 | 0.002199 | 0.003221 |
| Median | -0.001960 | -0.158858 | 0.275549 | 0.000000 | 0.470267 | 0.064484 |
| Maximum | 4.860258 | 6.965840 | 5.502585 | 1.917710 | 8.088514 | 4.491951 |
| Minimum | -4.908558 | -5.307135 | -6.569557 | -1.402750 | -8.786252 | -5.722499 |
| Std. Dev. | 0.621428 | 1.992358 | 2.543926 | 0.667126 | 2.392626 | 2.088444 |
| Skewness | 0.096557 | 0.582428 | 0.001057 | 0.292247 | -0.503612 | -0.487793 |
| Kurtosis | 29.12507 | 4.029327 | 2.437156 | 2.648096 | 2.942057 | 2.975804 |
| Jarque-Bera | 17774.91 | 62.92723 | 8.249952 | 12.12158 | 26.50674 | 24.80092 |
| Probability | 0.000000 | 0.000000 | 0.016164 | 0.002333 | 0.000002 | 0.000004 |
| Sum | 5.119607 | 4.367785 | 3.824007 | 0.036725 | 1.374181 | 2.013237 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Sum Sq. Dev. | 240.9717 | 2476.962 | 4038.254 | 277.7157 | 3572.186 | 2721.637 |
| Observations | 625 | 625 | 625 | 625 | 625 | 625 |

The panel unit root tests were performed on the main variables of interest that link FDI inwards (FDII) and outward (FDIO) stocks and total factor productivity (TFP). The panel unit root tests on the levels of the variables reported in Table 6 indicate that the p-values of the variables exceed 0.05 and therefore the null hypothesis of a unit root is not rejected and all the variables integrated order one or I(1). On the basis of the Levin et al. t-test ((Levin, 2002), the panel Fisher ADF and the Panel Fisher PP tests due to (Maddala, 1999).. While for the panel tests(Hadri, 2000) which reverses the null and alternative hypothesis like the KPSS test in the univariate the results reported in Table 7 reject the null of I(0) or stationarity in favour of the unit root alternative while the tests of the first difference form of the variable support the null of I(0) and reject the alternative of I(1) or nonstationarity. Therefore, the tests all reveal that all the variables or interest are integrated order or I(1) and their linear combinations could be cointegrated as hypothesized by the Engle-Granger representation theorem (Engle, 1987).

**TABLE 7 PANEL UNIT ROOT TESTS**

| Variable | LOG(FDII) | | | LOG(FDIO) | | |
|---|---|---|---|---|---|---|
| Level | Statistic | p-value | Order I | Statistic | p-value | Order I |
| Levin, Lin & Chu t* | -0.28 | 0.39 | I(1) | -0.73 | 0.23 | I(1) |
| ADF - Fisher Chi-sq. | 22.19 | 1.00 | I(1) | 24.47 | 1.00 | I(1) |
| PP - Fisher Chi-sq. | 24.78 | 1.00 | I(1) | 29.36 | 0.99 | I(1) |
| Hadri Z-stat | 2.02 | 0.02 | I(0) | 1.85 | 0.03 | I(0) |
| Het consistent Z | 1.77 | 0.04 | I(0) | 1.77 | 0.04 | I(0) |
| First difference | ΔLOGFDII) | p-value | Order I | ΔLOG(FDIO) | p-value | Order I |
| Levin, Lin & Chu t* | -33.18 | 0.00 | I(0) | -33.02 | 0.00 | I(0) |

| | | | | | | |
|---|---|---|---|---|---|---|
| ADF - Fisher Chi-sq. | 678.59 | 0.00 | I(0) | 687.10 | 0.00 | I(0) |
| PP - Fisher Chi-sq. | 832.29 | 0.00 | I(0) | 824.10 | 0.00 | I(0) |
| Hadri Z-stat | 6.64 | 0.00 | I(0) | 7.46 | 0.00 | I(0) |
| Het Con Z | 5.82 | 0.00 | I(0) | 7.34 | 0.00 | I(0) |

Explanatory Notes:
Null: Unit root (assumes common unit root process) for the Levin, Lin & Chu t-test
Null: Unit root (assumes individual unit root process for the ADF-Fisher & PP-Fisher tests
Automatic lag length selection based on SIC: 0 to 4 on SIC
Newey-West automatic bandwidth selection and Bartlett kernel
Fisher Tests: Probabilities computed assuming asymptotic Chi-square distribution and all other
Hadri Tests: High autocorrelation leads to severe size distortions and over-region of the null.

Next , the Pedroni methodology to test the null of no cointegration in dynamic heterogenous panels with multiple regressors is implemented for FDI-TFP series of interest ((Pedroni, 1999, Pedroni, 2001, Pedroni, 2004). The test results provide insights on the heterogeneity among individual countries on the relationships based on the panel data both in the long run and in the short-run as shown by cointegrating vectors with significant error correction mechanism.

In conventional time-series analysis cointegration occurs when a linear combination of variables that are individually integrated or order one i.e. I(1) are stationary or I(0). The vector of slope coefficients in the linear combinations defines the cointegrating vector. Panel cointegration tests overcomes the problem of low power when applied to series of moderate length. Pooling the panel data across individual countries is designed to overcome the lower power of tests when sample size is small by making available more information available through the panel approach. Recall that this issue was discussed in Section 4.

The Pedroni methodology offers seven different statistics, four of which are known as the panel tests are based on the pooling the residuals in estimating the regression along the within-dimension. The other three tests are known as group panel tests based on the pooling the residuals of the regression along the between-dimension. The within-dimension or panel tests takes into account common time factors and allows for heterogeneity across countries. While the between-dimension or group mean cointegration tests, allow for heterogeneity of parameters across countries. These seven panel cointegration and the critical values based on Monte Carlo simulations discussed in (Pedroni, 1999).

The results of the Panel unit root tests based on the Pedroni methodology are reported in Table 8 below:

**TABLE 8 PEDRONI RESIDUAL COINTEGRATION TESTS**

Major Series of interest: ΔΔTFP , ΔLOG(FDII) ,ΔLOG(FDIO)
Null Hypothesis: No cointegration Included observations: 650
Trend assumption: Deterministic intercept and trend
Automatic lag length selection based on SIC with a max lag of 4
Newey-West automatic bandwidth selection and Bartlett kernel
Alternative hypothesis: common AR coefs. (within-dimension)

| Panel tests | Statistic | p-val. | Statistic | p-val. |
|---|---|---|---|---|
| Panel v-Statistic | -6.484 | 1 | -5.745 | 1 |
| Panel rho-Statistic | -7.467 | 0 | -5.406 | 0 |
| Panel PP-Statistic | -14.68 | 0 | -14.35 | 0 |
| Panel ADF-Statistic | -14.69 | 0 | -13.93 | 0 |

Alternative hypothesis: individual AR coefs. (between-dimension)

| Group tests | Statistic | p-val. |
|---|---|---|
| Group rho-Statistic | -2.763 | 0.0029 |
| Group PP-Statistic | -15.52 | 0 |
| Group ADF-Statistic | -15.02 | 0 |

Pedroni cointegration tests support the rejection of the null of no cointegration for 9 out the 11 estimated panel cointegration tests that tests the growth rate of productivity (DTFP), foreign direct investment inflow (FDII) and outflows (FDIO). The within-dimension individual panel unit root tests reported in the Panel v-Statistic rejects the null of no cointegration. While all the between-dimension group statistic tests rejects the null hypothesis of no cointegration.

Therefore, the Pedroni heterogenous panel cointegration tests provide support for the hypothesis that the growth of total factor productivity and foreign direct investment inflows and outflows are cointegrated or exhibit a long-run equilibrium relationship.

However, the above tests fail to provide information on the direction of causation. This issue is tackled by the bivariate Granger causality tests the results of which are reported in Table 9 and the results indicate that the growth of foreign direct investment inflows cause increase total factor productivity and growth in total factor productivity in turn increases foreign direct investment inflows, thereby indicating the existence of bi-directional causality between foreign direct investment inflow (FDII) and growth of total factor productivity (TFP) causality. The bi-directional causality test results lend support to the crowding-in hypothesis that FDI inflows and outflows by increasing TFP that has the potential to generate positive externalities. However, FDI - inflows do not appear to Granger cause FDI-outflows and there was no evidence here to support bi-directional causality These results, nevertheless provide support for the crowding-output hypothesis and imply that FDI outflows support the crowding out hypothesis which has the potential to generate negative externalities through its adverse effects on domestic firms. The bivariate Granger causality tests are reported in Table 9.

**TABLE 9 PAIRWISE GRANGER CAUSALITY TESTS**

| Sample: 1982 2007 | Lags: 2 | | |
|---|---|---|---|
| Null Hypothesis: | Obs | F-Stat | Prob. |
| DLOG(FDII) does not Granger Cause DTFP | 575 | 0.0945 | 0.9098 |
| DTFP does not Granger Cause DLOG(FDII) | | 0.0597 | 0.942 |
| DLOG(FDIO) does not Granger Cause DTFP | 575 | 0.5104 | 0.6006 |
| DTFP does not Granger Cause DLOG(FDIO) | | 0.3856 | 0.6802 |
| DLOG(FDIO) does not Granger Cause DLOG(FDII) | 575 | 7.9405 | 0.0004 |
| DLOG(FDII) does not Granger Cause DLOG(FDIO) | | 18.806 | 0.0000 |

**Further empirical results based on FGLS estimate of equation**

The empirical results reported in this study are based on annual data from a sample of 25 OECD countries and aims to explain the total factor productivity (TFP) growth effect due to FDI inflows, FDI outflows, openness of the economy to international trade, government expenditure on R&D, capital formation after controlling for the effects of government expenditure, inflation and business cycle effects that reverberate through unemployment.

The empirical analysis has been performed by validating a cross-country panel time-series regression model specified in equation (1) has been empirically validated for a sample of 25 OECD countries to explain the spillover effects due TFP resulting from the effects of FDI inward stocks and outward stocks, technology transfer effects after controlling for key policy and structural effects as explained below:

$$\Delta TFP_{it} = \alpha_i + \beta_1 \Delta FDII_{it} + \beta_2 \Delta FDIO_{it} + \beta_3 \Delta OPEN_{it} + \beta_4 \Delta GERD_{it} + \beta_5 \Delta CAPF_{it} + \beta_7 \Delta GOVX_{it} + \beta_8 \Delta NFL_{it} + \beta_9 (1-1/\Delta EMP_{it}) + \mu_{it} \quad (3)$$

Where, $y_{it} = \Delta TFP_{it}$ , $x_{it} = (\Delta FDII_{it}, \Delta FDIO_{it}\ \Delta OPEN_{it,4} \Delta GERD_{it}, \Delta CAPF_{it}, \Delta GOVX_{it}, \Delta INFL_{it}, (1-1/\Delta EMP_{it}))$. $i = 1,..N$, $t = 1,\ldots T$.

All the variables notated with $\Delta$ estimate growth rates using the log difference of the variable for the country i in year t. The explanatory variables are: TFP: Total Factor Productivity, FDII: FDI inward stocks, FDIO: FDI outward stocks, OPEN: Openess to trade, GERD: R&D expenditure, CAPF: Capital Formation and th control variables are: GOVX: Government Expenditure, INFL: Inflation, UNEMP: Unemployment, the intercept term $\alpha_i$:country-specific fixed effect, $\mu_{it}$ : idiosyncratic error. Since the sample of OECD countries is assumed to have attained the same threshold level of development no proxies have been included to capture any institutional variations among the countries. In the empirical validation we have assumed that country-specific fixed effects are a more crucial determinant in account for variation of TFP spillover effects and GDP growth effects due FDI flows as hypothesized by Nath (2009) rather than the time invariant initial conditions as proxied by GDP per capita (GDPPC) or the Barro-effect in the convergence theory postulated by Barro and Xala-i-Martin (1995).

Table 5 summarizes the definitions of the variables and data-sources used in the empirical validation of the panel data TFP and FDI spillover effects model for the OECD countries investigated in this study.

The regression results from the from 9 sets of regressions using feasible GLS estimation with cross-country weights are reported in Table 6. Regression models referred in column (1) to (6) uses time-invariant GDP per capita (GDPPC) or the Barro effect, The results reported for regression models in columns ((7) to (9) are based on cross-country specific fixed effects model. The standard errors have been estimated using White' s heteroscedasticity consistent-variance covariance estimates that are robust to general heteroscedasticity. The regression models estimated with the time-invariant initial conditions (or Barro-effect) do not provide efficient estimators. But the regression models for cross-country specific effect models provide efficient estimators and therefore we focus mainly on these results for analyzing the TFP spillover effects due to FDI inward and outward stocks. Regression equation (7) includes inward FDI (FDII) but excludes the outward FDI (FDIO), while equation (8) includes FDIO but excludes FDII. Equation (9) includes both inward and outward FDI stocks. The regression coefficients for FDII and FDIO have positive and significant impacts on the TFP growth variable. The results from equation (9) are undermined by the multicollineaity between growth rates of FDII and FDIO. The value for the growth of FDII is 0.01 implying that 1% increase in growth of FDI inward stock results in growth of TFP by 0.01 percent. The coefficient of FDIO or growth of outward stock of FDI is also around 0.01 and is significant. Besides, R&D (GERD), capital formation (CAPF) also have positive effects on growth TFP as expected.

The control variables relating to policy proxied by government expenditure (GOVX) , inflation (INFL) and business cycle effects due to unemployment ( 1-1/EMP) all have negative effects on TFP growth as expected. The interaction term is not statistically significant and the regression results fail the residual test. Given that the sample of countries have attained the same threshold level of absorptive capacity )

It is noteworthy that empirical results for the TFP spillover effects and FDI inward and outward stocks and other explanatory and control variables are consistent with results reported for cross-section time-series studies for other countries (Borensztein, 1998) (Ghosh, 2009, van Pottelsberghe, 2001).

Table 10 TESTS FOR POOL , REDUNDATNT FIXED EFFECTS,

AND HAUSAMAN RANDOM EFFECTS.

| | | | | |
|---|---|---|---|---|
| DEP VAR LOG(DTFP) | | METHOD: | PANEL LS | |
| SAMPLE ADJ 1983-2007 | Periods 25 | Cross 25 | Panel 625 | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| C | 0.0040 | 0.0239 | 0.1656 | 0.8685 |
| DLOG(FDII) | 0.0129 | 0.0270 | 0.4799 | 0.6315 |
| DLOG(FDIO) | -0.0057 | 0.0173 | -0.3275 | 0.7434 |
| DLOG(OPEN) | 0.0174 | 0.0551 | 0.3149 | 0.7529 |
| DLOG(GERD) | 0.0020 | 0.0117 | 0.1701 | 0.8650 |
| DLOG(CAPF) | 0.0250 | 0.0568 | 0.4408 | 0.6595 |
| DLOG(GOVX) | -0.0272 | 0.0550 | -0.4955 | 0.6204 |
| INFL | 0.0002 | 0.0007 | 0.3724 | 0.7097 |
| DLOG(1-1/EMP) | -1.5840 | 18.2916 | -0.0866 | 0.9310 |
| DLOG(FDII)*DLOG(GERD) | -0.0064 | 0.0062 | -1.0300 | 0.3034 |
| R-squared | 0.0026 | Mean dependent var | | 0.0107 |

| | | | | |
|---|---|---|---|---|
| Adjusted R-squared | -0.0122 | S.D. dependent var | | 0.5584 |
| F-statistic | 0.1780 | Durbin-Watson stat | | 1.2319 |
| Prob(F-statistic) | 0.9963 | | | |
| **Redundant Fixed Effects Tests** | | | | |
| Effects Test | | Statistic | d.f. | Prob. |
| Cross-section F | | 1.0482 | - 24557.0000 | 0.4010 |
| Cross-section Chi-square | | 27.1676 | 24.0000 | 0.2967 |
| Period F | | 0.5632 | - 24557.0000 | 0.9548 |
| Period Chi-square | | 14.7448 | 24.0000 | 0.9280 |
| Cross-Section/Period F | | 0.7914 | - 48557.0000 | 0.8421 |
| Cross-Section/Period Chi-square | | 40.5729 | 48.0000 | 0.7679 |
| **Effects Specification** | | | S.D. | Rho |
| Cross-section random | | | 0.0000 | 0.0000 |
| Idiosyncratic random | | | 0.5613 | 1.0000 |
| **Correlated Random Effects - Hausman Test** | | | | |
| Test cross-section random effects | | | | |
| Test Summary | | Chi-Sq. Statistic | Chi-Sq. d.f. | Prob. |
| Cross-section random | | 14.7784 | 9.0000 | 0.0972 |

The LS estimates of the pooled cross-section time-series effects reported in Table 8 above indicate that the neither the intercept term (C) nor the explanatory variables are statistically significant as the p values exceed 0.30. The result that the intercept term or country specific fixed effects are the same for all countries is both intuitively and statistically inappropriate. Therefore, the Likelihood Ratio test for redundant fixed effects is performed and the results indicate that the Chi-squared and F-test version for restricting the i. The cross-section fixed effects to zero. ii. The period fixed effects to zero. iii. Both cross-section and period effects to zero are not rejected as the associated p-values exceed 0.29 .Therefore, the pooled sample is not rejected. Nevertheless, additional insights on the DGP are provided by testing for the significance of random effects of countries (cross-sections) but not periods (time). Furthermore, the results of the Hausman test for testing the null-hypothesis that the random effects are uncorrelated with the explanatory variables indicate that Chi-squared test statistic for 9 d.f. has a p-value <0.10 rejecting the validity of the random effects model in favour of the fixed effects model at the 10% level of significance. Therefore, the empirical tests reported above lend support to premise that the equations based on panel data fixed estimates econometric models reported in Table 7 below would provide plausible estimates on the TFP FDI dynamics for the OECD countries during the study period..

## TABLE 11 PANEL REGRESSION EQUATIONS

## –BARRO & COUNTRY-SPECIFIC EFFECTS

| Method: Panel EGLS (Cross-section weights) | | | | | Sample (adjusted): 1984 2007 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Periods included: 24 | | Cross-sections included: 25 | | | Total panel (unbalanced) observations: 586 | | | | |
| White diagonal standard errors & covariance (d.f. corrected) | | | | | | | | | |
| DEPVAR D(TFP) | Equation | 1 | Equation | 2 | Equation | 3 | Equation | 4 | Equa |
| Variable | Coeff. | P-value | Coeff. | P-value | Coeff. | P-value | Coeff. | P-value | Coeff |
| LOG(GDPPC) or CONST. | 0.0016 | 0.0521 | 0.0014 | 0.0742 | 0.0014 | 0.0794 | 0.0133 | 0.0111 | 0.0 |
| DLOG(FDII) | 0.0056 | 0.2028 | 0.0021 | 0.3896 | | | 0.0068 | 0.1241 | 0.0 |
| DLOG(FDIO) | -0.0026 | 0.3746 | | | 0.0001 | 0.9573 | -0.0029 | 0.3359 | |
| DLOG(OPEN) | 0.0039 | 0.6116 | 0.0032 | 0.6822 | 0.0031 | 0.6957 | 0.0050 | 0.4997 | 0.0 |
| DLOG(GERD) | -0.0014 | 0.5602 | -0.0010 | 0.6531 | -0.0013 | 0.5875 | -0.0007 | 0.7461 | -0.0 |
| DLOG(CAPF/GDP) | -0.0016 | 0.8494 | -0.0013 | 0.8710 | -0.0015 | 0.8612 | -0.0048 | 0.5227 | -0.0 |
| DLOG(GOVX/GDP) | -0.0001 | 0.9921 | -0.0001 | 0.9898 | 0.0002 | 0.9844 | 0.0033 | 0.6604 | 0.0 |
| INFL | 0.0006 | 0.0000 | 0.0006 | 0.0000 | 0.0006 | 0.0000 | 0.0010 | 0.0192 | 0.0 |
| DLOG(1-1/EMP) | 0.0262 | 0.9927 | 1.0715 | 0.6964 | 2.3793 | 0.2858 | -0.7057 | 0.7907 | 0.4 |
| DLOG(FDII)*DLOG(GERD) | -0.0004 | 0.6428 | -0.0003 | 0.7557 | -0.0003 | 0.7234 | | | |
| AR(1) | 0.4579 | 0.0000 | 0.4562 | 0.0000 | 0.4563 | 0.0000 | 0.2424 | 0.0000 | 0.2 |
| R-squared | 0.2667 | 0.0249 | 0.2641 | 0.0231 | 0.2613 | 0.0239 | 0.4714 | 0.0258 | 0.4 |
| Adjusted R-squared | 0.2540 | 0.5877 | 0.2526 | 0.5869 | 0.2498 | 0.5870 | 0.4398 | 0.6660 | 0.4 |
| S.E. of regression | 0.5079 | 148.3287 | 0.5077 | 148.4869 | 0.5087 | 149.0756 | 0.4987 | 137.2662 | 0.4 |
| Durbin-Watson stat | 2.0237 | | 2.0193 | | 2.0174 | | 14.9178 | 1.8757 | 15.2 |
| Explanatory notes. | | | | | | | | | |
| Equation (1) to (3) | Barro-effect proxied by DLOG(GDPPC) & INTERACTION EFFECT is PROXIED BY DLOG(FDII)DLOG(GERD) | | | | | | | | |
| Equation (4) to (6) | IDYISYCRATIC COUNTRY (CROSS-SECTION) FIXED EFFECTS ARE PROXIED BY THE CONSTANT TERM. | | | | | | | | |
| The adjusted R-sq shows that fixed effects models have a better 'Goodness of fit' than the Barro initial effect models/ | | | | | | | | | |
| The p-value fails to reject the no Barro-effect null hypothesis at 5% level. | | | | | | | | | |
| The p-value rejects the null hypothesis of no cross-section fixed effects at 5% level. | | | | | | | | | |
| The tests favour the fixed cross-section effects model rather than the Barro effect model. | | | | | | | | | |
| HAUSAMAN-TEST- Correlated Random Effects | | | | | | | | | |
| Test Summary | | | Test cross-section random effects | | | | | | |
| Cross-section random | | Chi-Sq.<br>Statistic | Chi-Sq.<br>d.f. | Prob. | | | | | |
| | | 14.12707 | 9 | 0.1179 | | | | | |
| P-VALUE <12% IMPLIES THAT RANDOM-EFFECTS MODEL IS NOT VALID AT < 12% LEVEL OF SIGNIFICANCE. | | | | | | | | | |

The interpretation of the empirical results reported in Table 9 are presented in the sequel.

The Hausman test results favour the cross-section or country fixed effects models rather than the random effects model at a p-value =0.12. The panel regression models (equations (1) to (3) in Table 9) indicate that the Barro-initial effect (coefficient of DLOG(GDPPC) have p-values >0.05 implying that the null-hypothesis that the Barro-effect is not significant at the 5% level of significance. The panel regression model (equations (4) to (6) in Table 7) indicate that p-value =0.01 implies the null that cross-sectional fixed effects are not-significant is not rejected at the 1% level of significance. Furthermore, 'the goodness of fit given by adjusted-R-squared is much higher for the country-specific fixed effects than the adjusted R-squared from the panel regressions (equations (4) to (6) Table 9) are much higher than the adjusted R-squared values for the Barro-effects panel regression equations (1) to (3) implying support for country-specific effects that Barro initial effects for the OECD countries during the study period .

The above finding that the country-specific' fixed effects' play a crucial role in explaining growth of TFP spillover effects than Barro 'initial effects' in the advanced (OECD) countries is consistent with similar findings in the GDP growth-FDI cross country empirics. These studies underscore that in developing countries that have not attained a threshold level of institutional development due to underdeveloped human capital, financial sector, the Barro initial conditions play a pivotal role in determining the absorptive capacity of FDI related growth spillover effects. While, in advanced countries TFP or growth spillover effects are not subject to institutional threshold constraints and the countries country-specific fixed effects play a key role in governing the technology transfer through FDI flows (Ghosh M and Wang W., 2009, Carkovic. M. and Levine. R. , 2009). Equation (1) to (3) Table 7 report the results for the' Barro effect' which are proxied by time-invariant initial conditions as captured by the log of per capita GDP (logGDPPC) as the crucial determinant of FDI flows and related TFP spillover effects for OECD countries as hypothesized by the convergence theories (Barro, 1995). The empirical findings for OECD countries differ from those reported for developing countries where the country-specific effects rather than the “Barro initial effect’ plays the significant role in determining whether FDI flows play the role of TFP increase and associated positive spillover effect (Ghosh M and Wang W., 2009)

The panel data empirics reported in Table 9 therefore clearly support the hypothesis that time-invariant initial conditions play a significant role in developed OECD countries in the transmission of technological spillover effects mainly through the conduits of FDI flows and of R& D (GERD). All the panel data regression empirics reported in Table 7 have been estimated using feasible GLS with cross-country weights. The standard errors have been estimated using White’s heteroscedasticity consistent covariances corrected for degrees of freedom yielding estimates that are robust to general heteroscedasticity using EVIEWS 7 computer software.

The Barro time-invariant initial conditions are significant for equation (1) and (3) with FDI inward stocks but not significant in FDI outward stocks. Therefore, initial conditions appear to play a significant role in inward stocks of FDI flows and in their interactions with GERD , but outward FDI stocks do not appear to influenced by the initial conditions for the cross-country regressions as reported in equation (2). The ‘goodness of fit’ measured by adjusted R-squared is low for these equations relating the Barro time-invariant initial effects compared to equations (4) to (6) which focus on the importance of country-specific idiosyncratic fixed effects rather than the Barro initial effects. The country-specific effects proxied by the constant term are significant for all the equations. The inward stocks of FDI (FDII) in equation(4) and the outward stocks of FDI (FDIO) are by themselves not significant, but they appear significant as a conduit for activating R&D as the interaction term FDI*GERD are significant for all the equations (4) to (6). Besides, domestic policy variables such expansionary monetary policy as shown by the coefficient for inflation (INFL) appears to have positive effects of on the TFP spillovers through the FDI*GERD interaction effects. An FDI friendly policy environment appears to play an important role in determining the TFP spillovers according to estimates focusing on the country-specific fixed effects in equations (4) to (6) in Table 9.

## 6. Concluding observations and Policy Perspectives.

The panel date econometric analysis undertaken in this paper focussing attention directly of the nexus between TFP and FDI inward and outward stocks for 25 OECD economies over a 25 year period (1983-2007) provide overwhelming support for the mainstream macroeconomic model hypotheses enunciated both by neoclassical and endogenous growth theories that FDI inflows and outflows generate technological spillovers and increase total factor productivity and therefore acts as an engine of growth in advanced countries. Advanced countries are not constrained by thresholds constraints imposed by deficiency of human capital due to scarcity of skilled workers, or due to underdeveloped banking and financial institutions, lack of adequate infrastructure, and proper enforcement of property rights that plague developing countries and undermine their absorptive capacity and skill development, lack of law and order, endemic corruption.

National concerns relating to Dutch disease effects and global concerns as articulated in Kyoto protocol and the findings of climate scientists that highlight the need to restrict carbon dioxide emissions in order reduce the dangers of global warming. Negative externalities due to mining of non-renewable resources or Dutch disease effects, environmental degradation and outsourcing of services and their negative externalities are areas for future research not addressed in this paper.

In this paper we study the impact of both inward and outward FDI on economic growth in the OECD countries using panel data estimation for the period 1980-2004. The main findings of our study are that both inward and outward FDI positively contribute to economic growth in the OECD. However, the impact of FDI in economic growth is moderate. Coefficients for all other variables in the cross-country regression model have the expected signs. Recent studies (e.g. (Golub, 2003a) and(Golub, 2003b), (Ghosh, 2007 June) suggest tremendous potential for growth in the flows of FDI across OECD countries through reduction of barriers. Our regression results indicate that the implications for economic growth from these are however moderate.

Contrary to earlier findings, essentially on developing countries, that the positive impact of FDI is conditional on countries' stock of human capital or a threshold absorptive capacity, our results from OECD data find that FDI exert positive influence on both host and source country economic growth irrespective of any threshold requirements. This is not surprising as our sample only includes the developed economies which have already reached a threshold level of human capital stock or the level of R&D.

A major contribution of this study is the provision of empirical information on how ot reconcile the conflicting objectives of austerity (spending cuts) through the increase TFP or more output with less inputs, with the objectives of growth that is generated by cross-border FDI flows. The conflicting objectives of austerity and growth are two sides of the same coin required to steer the sovereign debt ridden PIGS from imploding the single currency union and the euro zone. The crisis contagion from the collapse of the euro zone will not only have negative spillover effects on the OECD countries but also on the global economy.

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APPENDIX – PANEL DATABASE OECD *(Not for publication due to space constraints)*

| Appendix - Panel DATABASE | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| CON_IDENT | DTFP | GDP | GDPPC | FDII | FDIO | OPEN | INFL | GOVX | EN |
| Australia | 1 | 90907.96922 | 15889.84 | 26262.53 | 5731.628 | 0.6621 | -3.30863 | 13561.99 | |
| Austria | 4.1218 | 307893.9265 | 17798.34 | 3030.623 | 675.9154 | 0.6621 | -0.93654 | 13561.99 | |
| Belgium | 0.7163 | 58936.86625 | 16969.93 | 3000 | 3000 | 1.3299 | -3.06917 | 21562.9 | |
| Canada | 0.8677 | 52258.6959 | 17748.22 | 59227.27 | 30473.4 | 0.4749 | 3.846541 | 70468.23 | |
| Denmark | 0.6864 | 574493.0243 | 22223.13 | 2628.101 | 1386.45 | 0.7381 | -1.10805 | 16712.15 | |
| Finland | 0.7985 | 751505.2324 | 22397.16 | 1044.415 | 670.9318 | 0.5818 | -3.05478 | 9968.721 | |
| France | 0.695 | 52546.46412 | 18196.08 | 35676.77 | 32587.28 | 0.4623 | -3.14254 | 130511.9 | |
| Germany | 0.7282 | 3159.113848 | 22158.59 | 32130.86 | 45964.23 | 0.4806 | -1.26319 | 159998 | |
| Greece | 0.6437 | 20837.82464 | 8741.528 | 6127.7 | 2000 | 0.4923 | -5.22033 | 7941.19 | |
| Iceland | 0.6592 | 411662.9903 | 22219.44 | 57.42416 | 53 | 0.6907 | -7.22443 | 596.0345 | |
| Ireland | 0.7433 | 1083891.171 | 10198.04 | 35889.32 | 9000 | 0.9704 | -1.80294 | 4343.564 | |
| Italy | 0.736 | 79454.3 | 15984.88 | 7376.642 | 8424.09 | 0.4532 | 1.133705 | 75511.82 | |
| Japan | 0.7037 | 203057.2905 | 18287.17 | 3998 | 28969 | 0.2835 | 3.672464 | 154850.3 | |
| Korea, Republic of | 0.7217 | 1161.801257 | 3366.048 | 1363.159 | 246.509 | 0.6528 | 0.055733 | 9714.504 | |
| Mexico | 0.6769 | 106412.8692 | 3308.359 | 2983.77 | 1758.791 | 0.2800 | -8.16012 | 19722.29 | |
| Netherlands | 0.7086 | 61850.31583 | 16117.19 | 17975.6 | 39737.3 | 1.9055 | -3.02589 | 301.282 | |
| New Zealand | 0.6511 | 29192.88959 | 12300.51 | 2308.03 | 55.7283 | 0.4686 | -2.11984 | 10484.14 | |
| Norway | 0.6782 | 190311.3495 | 22687.37 | 7708.395 | 618.798 | 0.7784 | -3.57296 | 16939.33 | |
| Portugal | 0.6698 | 106412.8692 | 5714.509 | 3412.171 | 535.4961 | 0.5915 | -5.45845 | 3895.18 | |
| Spain | 0.6998 | 105123.3112 | 10382.25 | 5325.356 | 2953.8 | 0.3648 | -6.90078 | 28751.79 | |
| Sweden | 0.6638 | 86764.24211 | 23912.45 | 3427.24 | 5757.76 | 0.6637 | -5.20837 | 31278.19 | |
| Switzerland | 0.7328 | 492477.2254 | 30279.28 | 7000 | 17000 | 0.6703 | -0.39472 | 10968.9 | |
| Turkey | 0.6653 | 3246777.003 | 2042.036 | 8990 | 7000 | 0.2122 | -5.87572 | 6635.769 | |
| United Kingdom | 0.6646 | 184118.2328 | 13623.28 | 52149.7 | 84016.53 | 0.5024 | -5.27478 | 106949.4 | |
| United States | 0.7398 | 71494.2444 | 17831.47 | 124677 | 207752 | 0.1877 | 3.034947 | 571067 | |
| Australia | 1 | 86061.69676 | 16399.54 | 26458.31 | 6316.948 | 0.6453 | 1.596193 | 13722.66 | |
| Austria | 0.7312 | 333804.3143 | 18338.21 | 2750.22 | 746.2585 | 0.6453 | -2.98903 | 13722.66 | |
| Belgium | 1.4362 | 59204.86533 | 17033.29 | 4000 | 5000 | 1.3578 | -3.44944 | 20118.48 | |
| Canada | 1.3413 | 50400.24914 | 18049.56 | 64022.02 | 39940.97 | 0.4766 | -1.2565 | 75799.85 | |
| Denmark | 1.365 | 549026.7807 | 22828.97 | 2811.646 | 1494.938 | 0.7240 | -3.25015 | 16358.24 | |
| Finland | 1.1563 | 745824.3141 | 22929.09 | 1013.425 | 1306.294 | 0.5808 | 0.28369 | 9840.73 | |
| France | 1.3966 | 47557.59772 | 18308.69 | 37307.78 | 36554.74 | 0.4601 | -3.43939 | 125763.8 | |
| Germany | 1.2745 | 2724.978297 | 22594.75 | 29777.15 | 46253.18 | 0.4718 | -4.57636 | 156873.4 | |
| Greece | 1.4317 | 20149.74209 | 8601.066 | 6865.1 | 2400 | 0.4843 | -2.66493 | 7431.327 | |
| Iceland | 1.5042 | 426854.3993 | 21489.81 | 34.02416 | 57 | 0.7721 | -0.29355 | 516.3394 | |
| Ireland | 1.5097 | 1182299.817 | 10086.27 | 36058.97 | 11000 | 1.0094 | -4.11246 | 4106.544 | |
| Italy | 1.4484 | 88099.21841 | 16138.59 | 7320.277 | 13099 | 0.4186 | -1.98145 | 80032.41 | |
| Japan | 1.4763 | 174019.5922 | 18449.66 | 4364 | 37921 | 0.2613 | 1.711338 | 172534.3 | |
| Korea, | 1.7764 | 1155.98983 | 3669.164 | 1452.81 | 397.284 | 0.6345 | 1.189189 | 10277.04 | |

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|---|---|---|---|---|---|---|---|
| Republic of | | | | | | | |
| Mexico | 1.8065 | 97850.79162 | 3108.623 | 5175.369 | 1783.166 | 0.3098 | 9.687494 |
| Netherlands | 1.326 | 60780.25137 | 16368.77 | 16924.2 | 39781 | 1.7274 | -6.10892 |
| New Zealand | 1.3238 | 26050.83895 | 12523.29 | 2249.992 | 489.8763 | 0.5204 | -5.15849 |
| Norway | 1.3862 | 165977.9706 | 23490.26 | 8051.579 | 667.107 | 0.7579 | -3.18115 |
| Portugal | 1.5758 | 97850.79162 | 5676.351 | 3567.254 | 567.03 | 0.6254 | -2.59994 |
| Spain | 1.4145 | 104914.0655 | 10518.95 | 5277.92 | 3536.33 | 0.3974 | -0.44952 |
| Sweden | 1.3368 | 82911.91265 | 24353.41 | 3374.58 | 7341.9 | 0.7044 | -0.14215 |
| Switzerland | 1.3181 | 466934.9336 | 30280.81 | 8277.128 | 17849.52 | 0.6748 | -4.11501 |
| Turkey | 1.7219 | 3527963.004 | 2098.292 | 9036 | 9000 | 0.2318 | -5.2848 |
| United Kingdom | 1.4125 | 197983.5063 | 14091.88 | 54008.73 | 86874.91 | 0.5153 | -4.79443 |
| United States | 1.4297 | 67402.63254 | 18466.6 | 137061 | 218093 | 0.1791 | 2.997422 |
| Australia | 1.0001 | 82275.81045 | 17023.92 | 26385.32 | 6653.094 | 0.6876 | -12.1994 |
| Austria | 0.9701 | 347149.6964 | 18321.41 | 2674.104 | 1079.051 | 0.6876 | -0.23019 |
| Belgium | 0.9651 | 57714.6439 | 17457.07 | 5000 | 6000 | 1.4461 | 0.873733 |
| Canada | 1.0035 | 52259.10841 | 18895.7 | 65070.38 | 43142.75 | 0.5375 | -1.58912 |
| Denmark | 0.9328 | 521269.2899 | 23796.44 | 2761.368 | 1800.938 | 0.7396 | 0.921175 |
| Finland | 1.0311 | 701694.1657 | 23500.86 | 1039.816 | 1829.131 | 0.5729 | 1.001563 |
| France | 1.0293 | 46211.23615 | 18473.01 | 39506.29 | 38780.64 | 0.4830 | 1.316089 |
| Germany | 1.0137 | 2822.001925 | 23330.78 | 26934.88 | 59908.58 | 0.5007 | -0.62848 |
| Greece | 0.9849 | 19510.47847 | 8734.554 | 7588 | 2600 | 0.4811 | -1.53223 |
| Iceland | 0.9611 | 421901.3687 | 22116.47 | 47.72416 | 59.4609 | 0.7605 | 0.457126 |
| Ireland | 1.0206 | 1258070.288 | 10459.37 | 36180.33 | 12206.05 | 1.1187 | 1.386614 |
| Italy | 0.9852 | 97169.59849 | 16631.89 | 11565.28 | 16599.9 | 0.4420 | 0.203825 |
| Japan | 1.0461 | 205268.1186 | 18902.75 | 4458 | 43974 | 0.2736 | 1.038158 |
| Korea, Republic of | 1.0129 | 1167.612684 | 3905.19 | 1585.401 | 461.039 | 0.6342 | -1.76156 |
| Mexico | 1.0525 | 101769.2005 | 3162.693 | 6716.368 | 2005.145 | 0.2937 | 1.773355 |
| Netherlands | 1.0034 | 61098.8845 | 16858.5 | 18016.5 | 47813 | 1.6120 | -1.00068 |
| New Zealand | 0.9651 | 24116.23742 | 13027.34 | 1739.612 | 662.3608 | 0.6516 | -0.17679 |
| Norway | 1.01 | 167103.4295 | 24793.28 | 7831.03 | 1092.78 | 0.7697 | -0.10469 |
| Portugal | 1.1594 | 101769.2005 | 5551.625 | 3787.228 | 589.6069 | 0.6839 | 1.989799 |
| Spain | 1.0716 | 99955.38233 | 10667.29 | 6331.411 | 4455.4 | 0.4159 | 1.09072 |
| Sweden | 1.0151 | 80641.27502 | 25379.8 | 3337.23 | 10767.5 | 0.7031 | 1.173347 |
| Switzerland | 0.9916 | 439021.5497 | 31043.61 | 7652.998 | 25093.19 | 0.7146 | -1.09587 |
| Turkey | 1.0941 | 3922889.002 | 2193.413 | 9149 | 1163.97 | 0.2821 | 4.087404 |
| United Kingdom | 1.0166 | 173604.2099 | 14436.88 | 46375.54 | 100313.5 | 0.5632 | 1.049511 |
| United States | 1.0015 | 68782.54505 | 19600.28 | 164583 | 238369 | 0.1874 | 2.529866 |
| Australia | 0.9999 | 85156.19868 | 17513.6 | 26615.78 | 8653.712 | 0.7240 | 1.536704 |
| Austria | 1.1433 | 355708.4794 | 18768.18 | 3580.15 | 1219.11 | 0.7240 | 19.12346 |
| Belgium | 1.1057 | 61203.8532 | 17736.71 | 6000 | 7000 | 1.3970 | 17.91983 |
| Canada | 1.0358 | 55159.61198 | 19566.23 | 64656.89 | 46935.17 | 0.5424 | 0.878155 |
| Denmark | 1.0231 | 544152.0038 | 24762.96 | 3613.335 | 2454.938 | 0.7514 | 16.65398 |
| Finland | 1.0663 | 708870.1758 | 24158.12 | 1338.564 | 2341.865 | 0.5610 | 13.12194 |
| France | 1.1097 | 46013.64396 | 18680.85 | 41716.12 | 44011.37 | 0.4774 | 18.74437 |

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|---|---|---|---|---|---|---|---|---|
| Germany | 1.1036 | 2939.842439 | 23885.25 | 36925.61 | 78084.3 | 0.5188 | 19.27994 | 147157.9 |
| Greece | 1.0564 | 20639.57956 | 8916.104 | 8308.7 | 2856.477 | 0.4750 | 8.987449 | 7704.228 |
| Iceland | 1.1609 | 435686.2914 | 22583.82 | 71.32416 | 61.5609 | 0.8032 | 13.91775 | 539.4305 |
| Ireland | 1.2045 | 1346803.939 | 10742.97 | 36343.99 | 12206.05 | 1.1131 | 19.31738 | 4037.018 |
| Italy | 1.0929 | 100722.3555 | 17076.36 | 18976.47 | 26080 | 0.4441 | 16.8972 | 81441.53 |
| Japan | 1.0896 | 215658.8732 | 19752.5 | 4743 | 58071 | 0.2531 | 24.7624 | 188377.1 |
| Korea, Republic of | 1.1995 | 1189.889823 | 4110.195 | 1803.286 | 619.326 | 0.5995 | 2.402996 | 11143.37 |
| Mexico | 0.8786 | 106562.0396 | 3191.035 | 8699.968 | 2326.668 | 0.2811 | -22.0508 | 18464.21 |
| Netherlands | 1.1677 | 64256.95088 | 17154.45 | 24698.7 | 57540.8 | 1.5791 | 18.84767 | 353.0736 |
| New Zealand | 1.1922 | 25930.11096 | 13030.49 | 2042.901 | 749.1283 | 0.5648 | 13.47913 | 18595.28 |
| Norway | 1.1001 | 175542.7549 | 26030.08 | 7436.368 | 1608.65 | 0.7813 | 9.204538 | 16657.22 |
| Portugal | 1.4348 | 106562.0396 | 5696.931 | 4080.757 | 608.1529 | 0.6533 | 16.88634 | 3597.754 |
| Spain | 1.1222 | 101211.232 | 10880.62 | 8939.026 | 5937.54 | 0.4091 | 14.53896 | 27367.95 |
| Sweden | 1.0282 | 90378.97493 | 25889.82 | 4333.27 | 16131.4 | 0.6994 | 14.13273 | 29162.73 |
| Switzerland | 1.1523 | 463442.1191 | 31937.47 | 10093.38 | 34226.05 | 0.7407 | 19.84752 | 10759.15 |
| Turkey | 1.1532 | 4209469 | 2241.703 | 9248 | 1163.98 | 0.2783 | 3.069514 | 6525.83 |
| United Kingdom | 1.1823 | 181997.7952 | 14925.41 | 64027.56 | 118945.7 | 0.5611 | 9.773768 | 95342.59 |
| United States | 1.0725 | 98203.17766 | 20201.91 | 184615 | 270472 | 0.1776 | 1.909155 | 736335 |
| Australia | 0.9998 | 118476.1017 | 17654.57 | 27310.68 | 14881.37 | 0.6611 | 9.029793 | 19296.7 |
| Austria | 1.0072 | 368867.2185 | 19153.66 | 4989.278 | 1334.667 | 0.6611 | 15.83873 | 13722.66 |
| Belgium | 1.1469 | 86365.55676 | 18036.37 | 7000 | 8000 | 1.2668 | 14.48198 | 26946.47 |
| Canada | 0.9605 | 72556.50253 | 19779.22 | 69579.14 | 57037.24 | 0.5474 | 6.84872 | 80180.64 |
| Denmark | 1.0559 | 761419.8768 | 25986.35 | 4591.488 | 3073.938 | 0.6737 | 15.5686 | 20875.56 |
| Finland | 1.2023 | 1012517.95 | 24696.78 | 1680.434 | 4432.565 | 0.5035 | 12.1075 | 15031.1 |
| France | 1.138 | 54253.72485 | 19029.84 | 44464.55 | 52712.41 | 0.4138 | 12.90076 | 173000.9 |
| Germany | 1.1672 | 3930.526899 | 24383.63 | 49277.1 | 99144.48 | 0.4650 | 15.18554 | 208995.8 |
| Greece | 1.1043 | 27863.8231 | 8927.928 | 9071 | 2866.813 | 0.5018 | 11.6548 | 8611.935 |
| Iceland | 1.2079 | 616972.1657 | 23732.05 | 79.82416 | 62.2609 | 0.7331 | 18.63862 | 738.3851 |
| Ireland | 1.1986 | 1995533.661 | 10689.36 | 36594.28 | 12314.26 | 1.0033 | 9.466289 | 5512.07 |
| Italy | 0.7883 | 116031.1571 | 17550.93 | 25553.52 | 32331.8 | 0.3767 | 13.54667 | 113402.5 |
| Japan | 0.7253 | 151310.2374 | 20241.8 | 6514 | 77022 | 0.1869 | 13.67017 | 279448.4 |
| Korea, Republic of | 1.5381 | 1543.781557 | 4484.726 | 2238.947 | 939.423 | 0.6266 | 7.986626 | 12566.57 |
| Mexico | 0.7346 | 140938.2969 | 3013.891 | 11100.67 | 2293.923 | 0.3363 | 3.786754 | 12776.35 |
| Netherlands | 2.1449 | 77202.4265 | 17624.33 | 33354.2 | 72092 | 1.2979 | 14.16166 | 388.9164 |
| New Zealand | 1.9356 | 37050.97957 | 13226.84 | 2364.701 | 1309.156 | 0.5695 | 17.78489 | 20949.67 |
| Norway | 2.219 | 244016.3763 | 26980.87 | 8470.076 | 2455.03 | 0.7192 | 12.11962 | 24197.46 |
| Portugal | 0.5738 | 140938.2969 | 5930.286 | 4353.802 | 596.5423 | 0.5737 | 10.5234 | 5086.924 |
| Spain | 0.1634 | 144843.3563 | 11204.73 | 13435.96 | 8421.1 | 0.3539 | 11.39643 | 37554.33 |
| Sweden | 0.2313 | 101796.1748 | 26525.76 | 6012.612 | 23939.81 | 0.6346 | 11.28198 | 37955.48 |
| Switzerland | 1.9984 | 568691.3275 | 32276.42 | 18604.87 | 45276.06 | 0.7005 | 15.99329 | 15430.06 |
| Turkey | 3 | 4451578 | 2354.153 | 9373 | 1172.98 | 0.2356 | 3.161443 | 7387.769 |
| United Kingdom | 1.024 | 217488.6919 | 15489.24 | 76282.81 | 152609.5 | 0.5164 | 11.07798 | 116958.7 |
| United States | 0.8717 | 123087.8835 | 20672.8 | 220414 | 326253 | 0.1809 | 2.410536 | 792738 |
| Australia | 0.9666 | 147474.6693 | 18264.04 | 42955.61 | 28501.77 | 0.6493 | 16.6038 | 24153.26 |

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|---|---|---|---|---|---|---|---|---|
| Austria | 0.3242 | 421532.8151 | 19411.61 | 6648.267 | 1359.729 | 0.6493 | 3.320117 | |
| Belgium | 0.7787 | 107366.082 | 18414.82 | 8000 | 9000 | 1.2396 | 3.041952 | 3 |
| Canada | 0.3755 | 90377.00596 | 20331.95 | 81502.54 | 66876 | 0.5246 | 9.820914 | 8 |
| Denmark | 1.0784 | 924178.3794 | 26048.27 | 5628.639 | 3793.938 | 0.6385 | 4.521208 | 2 |
| Finland | 1.0223 | 1256278.938 | 25493.17 | 2620.122 | 5708.419 | 0.4988 | 9.551566 | 1 |
| France | 0.979 | 63170.69896 | 19391.99 | 49084.08 | 52533.94 | 0.4064 | 3.318621 | 2 |
| Germany | 0.7302 | 5438.529434 | 24685.96 | 64713.88 | 104186.4 | 0.4514 | 3.385697 | 2 |
| Greece | 1.7092 | 32913.71864 | 8696.261 | 10135.5 | 2884.011 | 0.4980 | 8.268405 | 1 |
| Iceland | 3.0858 | 776335.1067 | 25477.05 | 82.22416 | 56.29222 | 0.6959 | 9.271221 | 1 |
| Ireland | 1.0491 | 2420153.833 | 11207.32 | 36916.76 | 13064.39 | 1.0408 | 4.845956 | 6 |
| Italy | 1.0472 | 145950.933 | 18103.74 | 31353.43 | 36906.96 | 0.3704 | 4.664713 | 1 |
| Japan | 1.0374 | 163957.9054 | 20928.1 | 9018 | 110780 | 0.1765 | 13.0155 | 3 |
| Korea, Republic of | 0.9974 | 1613.760832 | 4918.947 | 2840.804 | 1095.617 | 0.6573 | 14.37507 | 1 |
| Mexico | 0.9971 | 171653.8414 | 3011.644 | 13735.27 | 2332.195 | 0.3591 | 13.22203 | 1 |
| Netherlands | 0.9663 | 92448.47828 | 17875.1 | 43449.4 | 73471.3 | 1.4293 | 2.880035 | 3 |
| New Zealand | 1.0678 | 46076.16545 | 13219.1 | 3159.424 | 1923.673 | 0.5642 | 16.56717 | 2 |
| Norway | 0.978 | 309478.061 | 27352.74 | 8616.125 | 3972.603 | 0.6700 | 6.799181 | |
| Portugal | 0.7829 | 171653.8414 | 6314.523 | 4869.681 | 642.0109 | 0.6326 | 6.401268 | 6 |
| Spain | 1.0564 | 180918.9742 | 11800.2 | 22992.05 | 9434.11 | 0.3631 | 8.350686 | 4 |
| Sweden | 0.9021 | 117175.6311 | 27311.25 | 9233.926 | 28422.93 | 0.6396 | 7.512175 | 4 |
| Switzerland | 0.9456 | 697700.0564 | 32474.02 | 26307.36 | 48907.05 | 0.6902 | 3.923214 | 1 |
| Turkey | 1.0329 | 4728278 | 2531.211 | 9488 | 1172.99 | 0.2650 | 1.334984 | 7 |
| United Kingdom | 1.0581 | 274882.9669 | 16162.12 | 109351.7 | 184958 | 0.5152 | 11.79096 | 1 |
| United States | 0.9722 | 132148.3596 | 21128.35 | 263394 | 347179 | 0.1920 | 3.073646 | |
| Australia | 0.9044 | 160218.2118 | 18633.06 | 62070.65 | 28950.23 | 0.6877 | 6.233687 | 2 |
| Austria | 0.7459 | 498163.5237 | 20032.11 | 6816.395 | 2878.329 | 0.6877 | -3.19397 | 1 |
| Belgium | 0.8372 | 113230.3601 | 19234.47 | 9000 | 10000 | 0.6877 | -1.86615 | 3 |
| Canada | 1.0616 | 107621.5746 | 21035.25 | 95728.18 | 77604.94 | 0.6877 | 7.617611 | 1 |
| Denmark | 1.0561 | 1005374.748 | 25985.15 | 5485.307 | 5859.938 | 0.6877 | -2.85405 | 2 |
| Finland | 0.9972 | 1355931.51 | 26714.63 | 3039.818 | 7938.187 | 0.6877 | 2.88092 | 2 |
| France | 0.928 | 73383.25397 | 20170.71 | 56286.8 | 76889.09 | 0.6877 | -3.05564 | 2 |
| Germany | 0.8638 | 6016.183109 | 25403.25 | 61525.59 | 121075.5 | 0.6877 | -3.36991 | 2 |
| Greece | 1.0262 | 36651.07216 | 9035.302 | 11632 | 2870.892 | 0.6877 | 0.00609 | 1 |
| Iceland | 1.0134 | 859008.2745 | 25179.98 | 94.55981 | 60.11117 | 0.6877 | -7.03554 | 1 |
| Ireland | 1.0533 | 2938525.965 | 11826.71 | 37174.2 | 14577.68 | 0.6877 | -1.59843 | |
| Italy | 0.9303 | 195406.4203 | 18859.25 | 36883.98 | 42779.22 | 0.6877 | 0.594493 | 1 |
| Japan | 0.9677 | 200783.465 | 22267.96 | 10416 | 154367 | 0.6877 | -5.35774 | 4 |
| Korea, Republic of | 1.0629 | 1673.085823 | 5377.711 | 3689.151 | 1488.02 | 0.6877 | 12.57394 | |
| Mexico | 1.0061 | 193829.6344 | 2990.745 | 16615.26 | 2449.134 | 0.6877 | 12.85679 | 1 |
| Netherlands | 0.8904 | 100057.3374 | 18370.13 | 42545.5 | 88004.6 | 0.6877 | -4.95927 | 3 |
| New Zealand | 0.9464 | 53881.99889 | 13135.72 | 3167.902 | 2058.829 | 0.6877 | -4.05456 | 2 |
| Norway | 0.9369 | 365230.5831 | 27190.29 | 8660.578 | 5094.482 | 0.6877 | -0.24687 | 2 |
| Portugal | 0.9676 | 193829.6344 | 6798.833 | 5861.227 | 737 | 0.6877 | 0.820194 | 7 |
| Spain | 1.0626 | 195539.8287 | 12377.31 | 29578.08 | 11371.7 | 0.6877 | 3.957644 | 5 |

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|---|---|---|---|---|---|---|---|---|
| Sweden | 1.0124 | 122128.8501 | 27877.93 | 9907.422 | 38220.65 | 0.6877 | 2.175323 | 49475.91 |
| Switzerland | 0.8688 | 847689.0362 | 33300.68 | 25229.85 | 54628.52 | 0.6877 | -7.06959 | 20934.7 |
| Turkey | 1.0509 | 5092167 | 2539.819 | 9842 | 1173 | 0.6877 | 11.64636 | 7505.426 |
| United Kingdom | 0.8979 | 304353.1666 | 16926.51 | 129654.3 | 194182 | 0.6877 | -0.97821 | 164012.6 |
| United States | 0.9439 | 131913.3385 | 21746.07 | 314754 | 381781 | 0.6877 | 3.522418 | 877279 |
| Australia | 0.9778 | 162108.986 | 19067.11 | 70169.88 | 30506.67 | 0.7289 | 2.177921 | 25123.81 |
| Austria | 1.5961 | 555517.4234 | 20663.69 | 9208.225 | 4746.903 | 0.7289 | 16.59788 | 19296.7 |
| Belgium | 0.7485 | 110058.7879 | 19844.09 | 10000 | 11000 | 1.4090 | 17.51147 | 32739.06 |
| Canada | 1.1312 | 117467.6383 | 21280.7 | 105945.8 | 84807.38 | 0.5134 | 4.486704 | 116944.2 |
| Denmark | 0.9039 | 1010119.614 | 26094.68 | 6905.335 | 7341.938 | 0.6972 | 17.77737 | 28016.57 |
| Finland | 0.7954 | 1353872.505 | 28071.66 | 3964.77 | 11227.3 | 0.4860 | 15.76162 | 23493.53 |
| France | 0.8011 | 76177.54263 | 20898.33 | 69348.07 | 112441.2 | 0.4478 | 16.84815 | 218498.7 |
| Germany | 0.8463 | 5588.534138 | 25987.18 | 84218.4 | 151581 | 0.4896 | 16.88187 | 265887.1 |
| Greece | 0.9296 | 38076.79926 | 9332.821 | 13011 | 2881.598 | 0.4796 | 19.13444 | 11506.84 |
| Iceland | 0.769 | 894717.4451 | 24979.37 | 108.3374 | 74.97743 | 0.6480 | 11.28249 | 1121.024 |
| Ireland | 0.821 | 2940287.139 | 12544.13 | 37366.96 | 14941.57 | 1.1619 | 13.67939 | 6016.005 |
| Italy | 0.7677 | 240260.9247 | 19493.94 | 49390.79 | 60184.31 | 0.3859 | 19.44328 | 172992.3 |
| Japan | 0.6933 | 244456.0701 | 23369.34 | 9160 | 201441 | 0.1930 | -2.48349 | 396644.3 |
| Korea, Republic of | 0.6846 | 1878.236153 | 5677.969 | 4426.412 | 2300.909 | 0.5633 | 4.625411 | 27295.47 |
| Mexico | 0.8528 | 204421.7045 | 3056.434 | 19790.76 | 2672.373 | 0.3467 | 10.82146 | 19258.02 |
| Netherlands | 1.0758 | 100770.512 | 19054.58 | 52051.5 | 106899.5 | 1.6110 | 15.4551 | 432.5604 |
| New Zealand | 1.0073 | 57946.30764 | 13115.66 | 5180.12 | 4421.912 | 0.6179 | 2.192532 | 32897.49 |
| Norway | 1.1508 | 402726.0533 | 27337.97 | 9690.098 | 10884.47 | 0.7248 | 12.67669 | 25896.3 |
| Portugal | 0.8666 | 204421.7045 | 7248.856 | 7669.5 | 900 | 0.6887 | 19.983 | 8580.898 |
| Spain | 0.6857 | 188114.1006 | 12950.19 | 41951.48 | 15651.54 | 0.3730 | 19.76886 | 65471.03 |
| Sweden | 0.7982 | 144027.0894 | 28477.83 | 10920.19 | 50719.55 | 0.6404 | 15.60677 | 52567.73 |
| Switzerland | 1.0442 | 855936.4419 | 34540.02 | 25669.38 | 66087.15 | 0.7484 | 18.52798 | 20468.39 |
| Turkey | 0.8915 | 5472304 | 2502.256 | 10505 | 1157 | 0.2706 | 22.31028 | 10863.49 |
| United Kingdom | 0.9891 | 310528.0276 | 17250.14 | 150200.9 | 229306.8 | 0.5096 | 14.39419 | 163441.5 |
| United States | 1.3641 | 164851.2946 | 22250.09 | 368924 | 430521 | 0.2083 | 3.719965 | 919431 |
| Australia | 1.1876 | 202688.6456 | 18673.29 | 73643.63 | 30888.81 | 0.7393 | 1.738071 | 31029.02 |
| Austria | 0.6972 | 582735.3174 | 21509.44 | 10971.68 | 5993.88 | 0.7393 | 1.076436 | 24153.26 |
| Belgium | 1.1667 | 135839.0686 | 20405.49 | 11000 | 12000 | 1.3699 | 0.676388 | 40529.4 |
| Canada | 1.0891 | 139560.8036 | 21036.73 | 112843.2 | 94382.14 | 0.5150 | 4.847279 | 129774.8 |
| Denmark | 1.2371 | 1246905.628 | 26428.11 | 9191.828 | 15608.35 | 0.6971 | -0.66179 | 34127.33 |
| Finland | 1.295 | 1714442.036 | 27988.06 | 5132.361 | 10845.15 | 0.4643 | -3.7047 | 30219.23 |
| France | 1.3045 | 94202.54678 | 21342.58 | 97814.2 | 132571.7 | 0.4384 | -1.03752 | 270947.3 |
| Germany | 1.3736 | 6372.905667 | 21583.55 | 111230.9 | 173265.2 | 0.4966 | 0.363855 | 330118.9 |
| Greece | 1.1229 | 47845.63165 | 9271.453 | 5680.8 | 2855.857 | 0.4718 | 4.177306 | 14301.86 |
| Iceland | 1.1982 | 1133465.444 | 25012.11 | 146.7413 | 100.9349 | 0.6598 | 7.056601 | 1269.264 |
| Ireland | 1.1272 | 3018270.974 | 13613.22 | 37988.87 | 15134.71 | 1.0850 | -0.93645 | 7779.396 |
| Italy | 1.4683 | 274976.0803 | 19886.16 | 59997.56 | 70400.18 | 0.3825 | 3.855534 | 228221.3 |
| Japan | 1.4501 | 288013.2464 | 24500.73 | 9850 | 231791 | 0.2003 | 10.64481 | 404536.8 |
| Korea, Republic of | 1.4118 | 1980.288633 | 6136.763 | 5185.608 | 3327.627 | 0.5393 | 6.803395 | 32050.13 |

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|---|---|---|---|---|---|---|---|---|
| Mexico | 1.2838 | 244717.0529 | 3149.848 | 22424 | 2849.283 | 0.3490 | 14.84599 |
| Netherlands | 0.9569 | 117623.7039 | 19720.04 | 68731 | 117255 | 1.7553 | 0.429603 |
| New Zealand | 0.9233 | 75278.36893 | 12970.98 | 7938.44 | 5890.608 | 0.6149 | -2.24628 |
| Norway | 1.0029 | 520938.2507 | 27731.73 | 12391.03 | 12154.7 | 0.7393 | -1.33491 |
| Portugal | 1.3441 | 244717.0529 | 7543.433 | 10571 | 1363 | 0.6907 | 8.617743 |
| Spain | 1.5813 | 239641.3311 | 13412.66 | 65916.39 | 20528.08 | 0.3552 | 4.899928 |
| Sweden | 1.3283 | 202545.7796 | 28592.35 | 12636.01 | 54797 | 0.6047 | 6.671958 |
| Switzerland | 0.9682 | 1006802.904 | 35535.97 | 34244.77 | 75884.4 | 0.7105 | 2.137398 |
| Turkey | 1.1202 | 5789487 | 2686.512 | 11189 | 1184 | 0.2435 | -0.67784 |
| United Kingdom | 1.0995 | 316709.7585 | 17335.83 | 203905.4 | 232140.9 | 0.5020 | 5.879272 |
| United States | 0.7996 | 172161.7208 | 22396.79 | 394911 | 467844 | 0.2126 | 3.490602 |
| Australia | 1.0162 | 207800.7057 | 18438.82 | 77057.15 | 34539.53 | 0.7241 | -4.57076 |
| Austria | 0.7621 | 598199.3803 | 22141.46 | 11510.64 | 6584.084 | 0.7241 | 10.1941 |
| Belgium | 0.9368 | 136694.8637 | 20715.4 | 12000 | 13000 | 1.3374 | 9.921132 |
| Canada | 1.112 | 125998.9601 | 20339.38 | 117024.9 | 87869.56 | 0.5081 | -4.15526 |
| Denmark | 1.0639 | 1246494.315 | 26703.25 | 14712.1 | 16305.7 | 0.7165 | 7.696101 |
| Finland | 1.0397 | 1808581.718 | 26121.42 | 4220.421 | 8564.538 | 0.4433 | -8.78796 |
| France | 0.9614 | 101180.0807 | 21457.18 | 110174.2 | 156329 | 0.4422 | 8.763984 |
| Germany | 0.945 | 6807.371248 | 22550.01 | 123992.1 | 178353.8 | 0.5194 | 11.58488 |
| Greece | 0.9865 | 48312.10565 | 9477.019 | 6815.8 | 2902.356 | 0.4537 | 10.17345 |
| Iceland | 0.99 | 1195221.06 | 24707.25 | 165.3901 | 98.37297 | 0.6383 | 6.484199 |
| Ireland | 0.9583 | 3451455.013 | 13849.39 | 39350.54 | 15349.1 | 1.0996 | 8.604573 |
| Italy | 0.9875 | 321269.921 | 20176.27 | 61575.56 | 70369.25 | 0.3571 | 5.291796 |
| Japan | 0.9804 | 344737.5917 | 25228.51 | 12297 | 248058 | 0.1845 | 8.955539 |
| Korea, Republic of | 0.9494 | 2076.591133 | 6654.659 | 6318.117 | 4425.365 | 0.5236 | 1.176341 |
| Mexico | 1.0135 | 258226.5764 | 3220.294 | 30790 | 3496.283 | 0.3247 | 13.30397 |
| Netherlands | 0.9935 | 119656.622 | 20068.04 | 72474.8 | 121061.3 | 1.7294 | 9.016019 |
| New Zealand | 0.9686 | 85337.35869 | 12614.61 | 10760.6 | 6281.63 | 0.6100 | -4.84282 |
| Norway | 1.0771 | 560376.8221 | 28447.1 | 15871.42 | 11798.69 | 0.7200 | 3.525888 |
| Portugal | 1.1325 | 258226.5764 | 7874.774 | 13020 | 2050 | 0.6408 | 20.93671 |
| Spain | 1.0131 | 242487.3635 | 13721.6 | 79570.6 | 27648.97 | 0.3539 | 8.715203 |
| Sweden | 1.0582 | 203036.7394 | 28093.32 | 18084.82 | 48842.82 | 0.5469 | 5.193678 |
| Switzerland | 1.0145 | 1051485.451 | 34866 | 35748.87 | 74413.67 | 0.6831 | 4.134957 |
| Turkey | 1.1731 | 5981530 | 2664.23 | 11999 | 1249 | 0.2416 | -0.61126 |
| United Kingdom | 1.0986 | 312817.186 | 17051.71 | 208345.6 | 221678.7 | 0.4704 | 3.726422 |
| United States | 1.0462 | 193090.383 | 22095.99 | 419108 | 502063 | 0.2121 | 2.380514 |
| Australia | 0.9998 | 231771.7006 | 18892.68 | 75777.77 | 40509.45 | 0.6996 | -6.39432 |
| Austria | 1.0829 | 579519.7419 | 22493.34 | 12040.11 | 7974.403 | 0.6996 | -3.26379 |
| Belgium | 1.0133 | 150194.661 | 20964.96 | 13000 | 14000 | 1.2977 | -3.71855 |
| Canada | 1.0956 | 110223.4576 | 20276.19 | 108502.9 | 92467.52 | 0.5456 | -4.99085 |
| Denmark | 1.098 | 1375425.024 | 27146.63 | 14387.3 | 15799.2 | 0.6946 | -6.72925 |
| Finland | 1.1605 | 2062247.491 | 25017.86 | 3688.847 | 9177.976 | 0.5090 | -17.5125 |
| France | 1.0799 | 111838.1204 | 21653.16 | 127883.3 | 158750.4 | 0.4297 | -5.46669 |
| Germany | 1.0681 | 6976.079399 | 22910.13 | 119965.3 | 186184.3 | 0.4861 | -2.26087 |

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|---|---|---|---|---|---|---|---|---|
| Greece | 1.0517 | 54264.00996 | 9446.102 | 7959.8 | 2879.924 | 0.4565 | -5.54715 | 15488.87 |
| Iceland | 1.0328 | 1265831.306 | 23641.95 | 123.2322 | 113.9145 | 0.6068 | -15.1208 | 1477.773 |
| Ireland | 1.1675 | 3767082.331 | 14253.47 | 40808.71 | 15569.11 | 1.1318 | -9.39714 | 9536.945 |
| Italy | 1.1101 | 343893.2038 | 20311.03 | 49963.42 | 81067.96 | 0.3670 | -20.3261 | 254523.1 |
| Japan | 1.1421 | 398629.399 | 25375.75 | 15511 | 259795 | 0.1764 | 17.34301 | 522312.7 |
| Korea, Republic of | 1.0678 | 2176.850436 | 6991.442 | 6885.361 | 5441.274 | 0.5142 | 3.705708 | 40874.13 |
| Mexico | 1.0887 | 267597.1841 | 3273.916 | 35680 | 3386.283 | 0.3235 | 11.23221 | 37715.97 |
| Netherlands | 0.9566 | 128298.961 | 20276.25 | 74439.7 | 120122.6 | 1.7572 | -4.16904 | 509.2489 |
| New Zealand | 1.0576 | 102895.5752 | 12529.75 | 12544.6 | 4430.723 | 0.6637 | 2.109598 | 31278.19 |
| Norway | 0.9978 | 612573.2747 | 29290.61 | 13647.19 | 12609.74 | 0.6901 | -10.6212 | 25146.19 |
| Portugal | 0.958 | 267597.1841 | 7955.805 | 14893 | 2198 | 0.5977 | -12.7656 | 17864.04 |
| Spain | 1.1187 | 252610.0913 | 13810.8 | 107839.6 | 29996.65 | 0.3590 | -18.0664 | 111978.6 |
| Sweden | 1.0285 | 213862.7085 | 27562.33 | 14056.51 | 45522.97 | 0.5435 | -25.641 | 76672.76 |
| Switzerland | 1.0222 | 1090253.456 | 34548.47 | 32989.9 | 91570.8 | 0.6788 | -2.71938 | 30679.83 |
| Turkey | 0.9901 | 6323723 | 2774.522 | 12843 | 1263 | 0.2516 | 4.899918 | 22198.64 |
| United Kingdom | 0.9692 | 312793.7656 | 17040.27 | 172986.3 | 245629 | 0.4803 | -13.441 | 226382.5 |
| United States | 1.0906 | 188278.4549 | 22565.97 | 423131 | 564283 | 0.2136 | 2.43777 | 1057487 |
| Australia | 0.9778 | 221825.2995 | 19447.22 | 82889.72 | 47774.08 | 0.6551 | 8.024598 | 38030.69 |
| Austria | 1.8317 | 563676.1194 | 22391.62 | 12105.77 | 9623.482 | 0.6551 | 4.932842 | 31029.02 |
| Belgium | 0.9599 | 140625.7796 | 20697.31 | 14000 | 15000 | 1.2294 | 5.956523 | 47532.41 |
| Canada | 0.921 | 87353.63557 | 20520.58 | 106867.8 | 104302.1 | 0.6042 | -4.257 | 132676.9 |
| Denmark | 1.0199 | 1293702.061 | 27026.92 | 14617.9 | 19612.86 | 0.6804 | 3.513782 | 37183.88 |
| Finland | 1.0645 | 2004389.959 | 24657.25 | 4216.613 | 12533.94 | 0.5885 | 7.58677 | 21133.74 |
| France | 0.9819 | 104710.2798 | 21364.32 | 135077.9 | 182326.8 | 0.4114 | 3.452143 | 311381 |
| Germany | 1.1591 | 6126.457214 | 22592.73 | 116133.9 | 225734.8 | 0.4459 | 4.722465 | 393538.8 |
| Greece | 0.9238 | 50861.51082 | 9193.714 | 8936.8 | 2895.71 | 0.4354 | 5.508057 | 15093.34 |
| Iceland | 0.9779 | 1020950.862 | 23723.88 | 116.8706 | 149.2094 | 0.6238 | -0.81789 | 1328.368 |
| Ireland | 1.0013 | 4324015.954 | 14550.84 | 41886.6 | 16005.82 | 1.2048 | 2.953798 | 8839.855 |
| Italy | 0.9264 | 377512.6039 | 20109.04 | 53949.48 | 89629.15 | 0.3953 | 0.941615 | 203794.5 |
| Japan | 1.033 | 442028.8198 | 25340.85 | 16884 | 275574 | 0.1611 | 12.18264 | 620500.7 |
| Korea, Republic of | 1.1366 | 2319.904085 | 7367.649 | 7431.627 | 7470.629 | 0.4984 | 8.634549 | 44098.57 |
| Mexico | 0.9995 | 202145.0278 | 3275.141 | 40600 | 4444.283 | 0.3136 | -0.07357 | 46454.29 |
| Netherlands | 1.0413 | 118167.8512 | 20397.24 | 74478.1 | 142953.5 | 1.6848 | 4.374305 | 588.8155 |
| New Zealand | 1.0172 | 90861.55394 | 13084.5 | 15539.1 | 5896.214 | 0.7044 | 11.12082 | 28066.32 |
| Norway | 1.0029 | 509851.8509 | 29938.75 | 13620.64 | 17731.44 | 0.6944 | 0.282217 | 23996.6 |
| Portugal | 1.057 | 202145.0278 | 7782.767 | 16427 | 2485 | 0.5751 | 4.580186 | 16322.1 |
| Spain | 0.8882 | 245760.1507 | 13627.14 | 100298.6 | 29060.61 | 0.3693 | -1.25539 | 96024.78 |
| Sweden | 0.9892 | 242531.2741 | 26825.64 | 13126.99 | 60309.59 | 0.6185 | 3.077818 | 58215.1 |
| Switzerland | 1.0479 | 979172.2805 | 34141.45 | 38713.69 | 112585.9 | 0.6719 | 9.736835 | 29382.72 |
| Turkey | 0.9366 | 6643991 | 2945.561 | 13479 | 1312 | 0.2597 | -24.2518 | 25496.25 |
| United Kingdom | 1.1354 | 355750.4687 | 17377.39 | 179232.7 | 276743.8 | 0.5158 | 3.521466 | 196448.3 |
| United States | 1.0189 | 201203.1982 | 22900.96 | 467412 | 612893 | 0.2148 | 2.288577 | 1073757 |
| Australia | 0.928 | 241745.2171 | 20094.58 | 95519.41 | 53009.06 | 0.6836 | 3.646139 | 40921.44 |
| Austria | 0.6701 | 564478.15 | 22828.44 | 14804.27 | 11831.72 | 0.6836 | 17.50947 | 32709.47 |

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|---|---|---|---|---|---|---|---|
| Belgium | 0.9734 | 153594.3816 | 21301.96 | 15000 | 16000 | 1.2770 | 16.78334 |
| Canada | 0.8194 | 100284.3681 | 21280.44 | 110203.9 | 118105 | 0.6683 | 1.602299 |
| Denmark | 0.8723 | 1366998.193 | 28411.87 | 18083.2 | 24702.5 | 0.7014 | 15.53147 |
| Finland | 0.9696 | 2146238.272 | 25413.62 | 6714.033 | 14993.35 | 0.6381 | 19.63684 |
| France | 0.9451 | 112211.3518 | 21748.78 | 163446.9 | 204431 | 0.4283 | 13.4096 |
| Germany | 0.8445 | 6294.80182 | 23074.76 | 139153.5 | 268419.3 | 0.4604 | 17.5689 |
| Greece | 1.0025 | 55405.73171 | 9280.649 | 9917.8 | 2937.305 | 0.4254 | 17.12007 |
| Iceland | 1.0667 | 1053976.841 | 24346.04 | 126.7204 | 179.7026 | 0.6638 | 11.0881 |
| Ireland | 1.0084 | 4760419.187 | 15281.5 | 42743.58 | 16826.69 | 1.3069 | 10.57816 |
| Italy | 0.9979 | 441416.5728 | 20527.28 | 60376.11 | 106323.1 | 0.4228 | 3.50381 |
| Japan | 1.0442 | 461300.8998 | 25527.61 | 19211 | 238452 | 0.1617 | 12.10162 |
| Korea, Republic of | 1.0604 | 2492.785944 | 7940.235 | 8226.964 | 10230.54 | 0.5112 | 14.2779 |
| Mexico | 0.7636 | 217623.8373 | 3356.498 | 33197.7 | 4181.283 | 0.3505 | -38.3388 |
| Netherlands | 1.0545 | 124519.521 | 20865.6 | 93409.1 | 172672 | 1.6620 | 17.20158 |
| New Zealand | 1.0039 | 95335.97847 | 13536.11 | 22062.17 | 7675.623 | 0.7031 | 13.65453 |
| Norway | 1.0316 | 515144.1734 | 31273.81 | 16282.17 | 22519.39 | 0.7017 | 13.58565 |
| Portugal | 0.9784 | 217623.8373 | 7843.099 | 17697 | 3574.253 | 0.6070 | 16.52881 |
| Spain | 0.929 | 272170.7001 | 13909.81 | 93147.64 | 34635.59 | 0.4164 | 12.00685 |
| Sweden | 0.9752 | 175628.2021 | 27722.61 | 22649.6 | 73182.84 | 0.6780 | 10.82837 |
| Switzerland | 1.0025 | 1059483.303 | 34242.91 | 48667.48 | 142479.3 | 0.6696 | 18.71991 |
| Turkey | 1.2199 | 7060147 | 2736.721 | 14087 | 1425 | 0.3347 | 16.58723 |
| United Kingdom | 1.0051 | 384085.6317 | 18076.71 | 189587.5 | 304865 | 0.5331 | 5.864254 |
| United States | 0.8184 | 238330.4327 | 23546.13 | 480667 | 699015 | 0.2253 | 2.267794 |
| Australia | 1.0758 | 284324.9784 | 20693.19 | 104074.4 | 66816.14 | 0.7069 | 7.151974 |
| Austria | 1.2116 | 590499.7726 | 23143.08 | 19720.49 | 13059.97 | 0.7069 | -5.0172 |
| Belgium | 1.1667 | 181985.5894 | 21752.59 | 16000 | 17000 | 1.3125 | -5.53663 |
| Canada | 1.0972 | 130600.9096 | 21658.14 | 123181.2 | 132329.1 | 0.7146 | 2.127007 |
| Denmark | 1.0197 | 1573017.037 | 29166.7 | 23800.9 | 27622.17 | 0.7119 | -1.72604 |
| Finland | 1.0723 | 2522623.668 | 26300.46 | 8464.645 | 17665.76 | 0.6514 | -4.9882 |
| France | 1.1268 | 131725.84 | 22121.27 | 191433.7 | 231094.3 | 0.4441 | -1.01929 |
| Germany | 1.0193 | 7018.106402 | 23417.43 | 165914.2 | 290837.4 | 0.4744 | -5.65354 |
| Greece | 1.108 | 67091.66721 | 9391.176 | 10970.8 | 2911.937 | 0.4364 | 4.345222 |
| Iceland | 1.0445 | 1126076.952 | 24140.24 | 129.0817 | 240.7086 | 0.6744 | -0.33938 |
| Ireland | 1.0591 | 5247610.125 | 16628.24 | 44186.51 | 17554.65 | 1.4062 | 2.29379 |
| Italy | 1.0438 | 539073.8092 | 21105.39 | 65349.97 | 117341.1 | 0.4767 | 10.32266 |
| Japan | 1.0918 | 313728.2092 | 25946.54 | 33531 | 258612 | 0.1692 | -22.6084 |
| Korea, Republic of | 0.9902 | 2571.313266 | 8604.317 | 9497.42 | 13827.9 | 0.5560 | 1.054368 |
| Mexico | 1.1783 | 253706.424 | 3092.388 | 41129.6 | 4219.283 | 0.5300 | 10.54415 |
| Netherlands | 0.9747 | 148920.8633 | 21378.9 | 116049.1 | 194025.3 | 1.6674 | -4.46846 |
| New Zealand | 1.016 | 112958.5181 | 13885.98 | 25727.61 | 9293.317 | 0.6994 | 7.30655 |
| Norway | 1.0201 | 596753.9328 | 32400.72 | 18800.44 | 25440.43 | 0.6975 | 2.453879 |
| Portugal | 0.9971 | 253706.424 | 8160.513 | 18981.53 | 4198.475 | 0.6361 | 0.699805 |
| Spain | 1.0814 | 318376.6449 | 14251.73 | 104521.5 | 45100.26 | 0.4477 | 1.96379 |
| Sweden | 1.2233 | 227606.7782 | 28704.71 | 31042.62 | 72132.73 | 0.7274 | 7.303015 |

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|---|---|---|---|---|---|---|---|---|
| Switzerland | 0.9673 | 1155629.076 | 34116.42 | 57062.84 | 141590.8 | 0.6674 | -5.46572 | 37675.76 |
| Turkey | 0.8639 | 7387641 | 2883.262 | 14972 | 1535 | 0.3505 | 0.150361 | 19818.01 |
| United Kingdom | 1.0561 | 427039.4069 | 18556.96 | 199771.8 | 330432.6 | 0.5668 | 2.406143 | 225656 |
| United States | 0.9664 | 234157.1417 | 23849.14 | 535553 | 795195 | 0.2397 | 2.144807 | 1131793 |
| Australia | 0.9574 | 275432.7422 | 21270.01 | 116724.1 | 71935.25 | 0.7270 | -4.33745 | 47722.56 |
| Austria | 0.9932 | 613775.8975 | 23675.19 | 19629.37 | 14010.95 | 0.7270 | -16.6712 | 38030.69 |
| Belgium | 0.9711 | 184437.0679 | 21963.87 | 17000 | 18000 | 1.3535 | -15.5333 | 60570.73 |
| Canada | 0.96 | 128476.0737 | 21798.47 | 132977.5 | 152968.3 | 0.7275 | -0.32504 | 125533.5 |
| Denmark | 0.9601 | 1576825.049 | 29870.64 | 22340 | 28127.7 | 0.7096 | -12.2975 | 46852.11 |
| Finland | 0.8929 | 2438564.677 | 27179.67 | 8797.347 | 20297.38 | 0.6686 | -8.82237 | 29846.76 |
| France | 0.8775 | 139290.1368 | 22281.62 | 200156.4 | 237271.1 | 0.4488 | -13.5479 | 377217.4 |
| Germany | 1.0251 | 7330.962406 | 23587.73 | 162513.5 | 308839.4 | 0.4889 | -16.3849 | 483182 |
| Greece | 0.9137 | 74085.366 | 9543.103 | 12028.8 | 3067.6 | 0.4415 | -7.97347 | 20403.25 |
| Iceland | 0.7961 | 1259660.34 | 25044.99 | 199.3572 | 271.5849 | 0.7196 | -3.69772 | 1606.782 |
| Ireland | 0.9529 | 4635653.364 | 17850.64 | 46803.99 | 18354.58 | 1.4239 | -1.71896 | 11536.66 |
| Italy | 0.9313 | 581320.0852 | 21270.62 | 74640.08 | 139546.1 | 0.4479 | -7.3531 | 229978.6 |
| Japan | 0.7656 | 364346.7277 | 26589.03 | 29940 | 271904.6 | 0.1915 | -13.2446 | 710992.6 |
| Korea, Republic of | 0.8055 | 2691.843575 | 9133.978 | 11509.56 | 16821.5 | 0.5603 | -15.6423 | 66664.5 |
| Mexico | 0.9369 | 276186.1316 | 3193.881 | 46912 | 5327.283 | 0.5667 | 14.46488 | 33496.58 |
| Netherlands | 0.8062 | 160158.0926 | 21969 | 126542.7 | 198554.6 | 1.6312 | -13.8531 | 676.0894 |
| New Zealand | 0.8525 | 117640.0032 | 14201.05 | 34743.69 | 5646.559 | 0.6346 | -2.36981 | 37955.48 |
| Norway | 0.8594 | 622468.4388 | 33864.28 | 21001.16 | 27967.25 | 0.7261 | -6.75729 | 33687.98 |
| Portugal | 0.8898 | 276186.1316 | 8433.773 | 21118.14 | 5741.852 | 0.6331 | -11.9989 | 21387.66 |
| Spain | 0.9152 | 307253.1135 | 14558.01 | 119766.3 | 53050.19 | 0.4671 | -12.3726 | 111974.8 |
| Sweden | 1.0265 | 243933.0383 | 29061.11 | 34835.1 | 78151.58 | 0.7053 | -11.6125 | 75316.93 |
| Switzerland | 0.8228 | 1220515.769 | 34155.35 | 53918.23 | 165364.6 | 0.6822 | -18.9052 | 36785.64 |
| Turkey | 0.8292 | 7810487 | 3032.779 | 15694 | 1786 | 0.3901 | -2.58473 | 22785.33 |
| United Kingdom | 0.9606 | 428515.3409 | 19021.61 | 228642.6 | 360796.3 | 0.5841 | 8.627042 | 232031.9 |
| United States | 1.0423 | 206873.921 | 24437.02 | 598021 | 871316 | 0.2423 | 1.954746 | 1167913 |
| Australia | 0.9677 | 249414.8731 | 21979.24 | 101042.4 | 78635.05 | 0.7937 | -16.0932 | 40231.61 |
| Austria | 0.9585 | 637528.7986 | 24077.26 | 19521.68 | 17468.06 | 0.7937 | -1.17196 | 40921.44 |
| Belgium | 0.8937 | 170436.363 | 22692.64 | 18000 | 19000 | 1.4355 | 0.650865 | 53540.12 |
| Canada | 0.9187 | 123206.3679 | 22513.26 | 135943.6 | 171779.8 | 0.7702 | -6.69852 | 124045.9 |
| Denmark | 0.9235 | 1427242.272 | 30696.68 | 22267.8 | 38876.85 | 0.7390 | -0.28198 | 42551.4 |
| Finland | 0.8951 | 2160569.896 | 28756.85 | 9529.766 | 29407.38 | 0.6934 | 0.411517 | 27473.36 |
| France | 0.8855 | 135879.28 | 22695.62 | 195863.6 | 288069.9 | 0.4850 | -0.17968 | 340749.7 |
| Germany | 0.9623 | 7422.992231 | 23979.47 | 158832.1 | 372492.5 | 0.5370 | -0.99552 | 418978.5 |
| Greece | 1.0258 | 81153.18804 | 9832.585 | 13012.8 | 2792 | 0.4790 | -3.58056 | 20739.17 |
| Iceland | 1.0305 | 1192358.39 | 25987.52 | 335.9102 | 342.2389 | 0.7194 | 4.896097 | 1609.381 |
| Ireland | 1.0534 | 4258577.791 | 19705.79 | 48939.92 | 20313.46 | 1.4573 | 0.557889 | 12138.15 |
| Italy | 0.9157 | 538206.0158 | 21698.83 | 85468.45 | 176963 | 0.4659 | 0.605276 | 218379 |
| Japan | 0.9461 | 439481.2192 | 26947.25 | 27079.65 | 270034.6 | 0.2065 | -9.46042 | 652636.9 |
| Korea, Republic of | 0.7623 | 2777.219433 | 9480.214 | 14151 | 20293.1 | 0.6188 | -33.8052 | 61359.28 |
| Mexico | 0.9866 | 252393.9374 | 3350.904 | 55810 | 6009.681 | 0.5533 | -0.00814 | 41501.59 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Netherlands | 1.0057 | 158223.0424 | 22768.98 | 122192.7 | 229000.1 | 1.4250 | 0.264768 | 7 |
| New Zealand | 0.8488 | 111953.4151 | 14298.6 | 31507.18 | 5490.835 | 0.6396 | -22.461 | 4 |
| Norway | 0.9151 | 572661.1686 | 35492.76 | 22485.89 | 23719.21 | 0.7451 | -7.05196 | 3 |
| Portugal | 0.9745 | 252393.9374 | 8760.044 | 22392.51 | 10225.07 | 0.6519 | 1.253092 | 2 |
| Spain | 0.8974 | 266880.1742 | 15082.3 | 105295.5 | 74133.45 | 0.5174 | 0.416862 | 1 |
| Sweden | 1.1205 | 255243.1829 | 29761.7 | 41453.6 | 93573.5 | 0.7673 | -3.26305 | 6 |
| Switzerland | 1.0263 | 1358947.156 | 34742.06 | 59518.93 | 184232.3 | 0.7501 | 0.422539 | 3 |
| Turkey | 0.8665 | 8304986 | 3206.173 | 16499 | 2153 | 0.4352 | 2.177425 | [illegible] |
| United Kingdom | 0.9488 | 381799.3356 | 19558.6 | 252958.6 | 488372.1 | 0.5668 | 4.49657 | 2 |
| United States | 1.0451 | 212145.8297 | 25229.84 | 681842 | 1000703 | 0.2503 | 1.30286 | 1 |
| Australia | 1.0589 | 255131.0823 | 22860.89 | 105944.4 | 89556.2 | 0.8166 | 4.306003 | 4 |
| Austria | 0.9315 | 616781.7793 | 24920.47 | 23564.24 | 19126.87 | 0.8166 | -3.8218 | 4 |
| Belgium | 1.1792 | 173653.201 | 23032.58 | 19000 | 20000 | 1.4505 | -4.14826 | 5 |
| Canada | 1.2156 | 130237.03 | 23227.5 | 143344.7 | 201434.2 | 0.8088 | 1.401668 | 1 |
| Denmark | 1.094 | 1474678.247 | 31228.61 | 35693.89 | 51332.65 | 0.7432 | -2.45068 | 4 |
| Finland | 1.1459 | 2184474.594 | 30179.68 | 16455.06 | 33849.52 | 0.6803 | -2.8416 | 2 |
| France | 1.1273 | 136514.8739 | 23399.73 | 246214 | 334096.8 | 0.4993 | -4.31924 | 3 |
| Germany | 1.1917 | 8291.725191 | 24452.1 | 206776.4 | 413394.6 | 0.5595 | -4.14814 | 4 |
| Greece | 1.1861 | 88116.38434 | 10116.1 | 13084 | 3935 | 0.4929 | -0.47434 | 2 |
| Iceland | 1.1885 | 1217117.061 | 27375.07 | 465.9983 | 454.4728 | 0.7387 | 1.391431 | 1 |
| Ireland | 1.1334 | 3856551.243 | 21082.21 | 62450.23 | 25231.54 | 1.6183 | -0.93884 | 1 |
| Italy | 1.1534 | 360101.1496 | 22035.44 | 108821.6 | 181851.7 | 0.4729 | -3.10406 | 2 |
| Japan | 1.1764 | 461558.2734 | 26345.63 | 26064.01 | 248776.9 | 0.1994 | 15.58077 | 6 |
| Korea, Republic of | 1.6096 | 2807.531166 | 8757.845 | 19223.29 | 23333.6 | 0.7517 | 15.31675 | 4 |
| Mexico | 1.3018 | 253097.4046 | 3460.785 | 63610.4 | 7910.232 | 0.5787 | 12.62366 | 4 |
| Netherlands | 1.1582 | 151139.2 | 23521.55 | 164473.2 | 260874.5 | 1.4809 | -2.60059 | 6 |
| New Zealand | 1.2083 | 118547.1449 | 14245.83 | 33190.54 | 7006.237 | 0.6354 | -0.4725 | 4 |
| Norway | 1.1443 | 600849.3123 | 36241.87 | 25618.42 | 29814.17 | 0.7346 | 2.955996 | 4 |
| Portugal | 1.1412 | 253097.4046 | 9152.1 | 30088.81 | 11492.83 | 0.6684 | -1.49805 | 2 |
| Spain | 1.1444 | 275109.6313 | 15702.84 | 126059.5 | 118040.5 | 0.5355 | -1.7603 | 1 |
| Sweden | 1.2206 | 269262.0543 | 30907.05 | 51002.65 | 106249.6 | 0.7961 | -2.67977 | 6 |
| Switzerland | 1.1036 | 1455892.099 | 35563.63 | 71995.13 | 194584.7 | 0.7635 | -3.11788 | 3 |
| Turkey | 0.9925 | 8752441 | 3250.7 | 17439 | 2798 | 0.4152 | -3.01648 | 2 |
| United Kingdom | 1.105 | 416179.8768 | 20157.49 | 337386.2 | 686420.1 | 0.5385 | -0.14953 | 2 |
| United States | 1.1762 | 210923.9792 | 25969.66 | 778418 | 1215960 | 0.2454 | 1.722633 | 1 |
| Australia | 0.9812 | 253825.9926 | 23500.97 | 120588.8 | 85385.45 | 0.8347 | -5.42822 | 4 |
| Austria | 0.9096 | 661250.6296 | 25720.46 | 23471.09 | 24820.64 | 0.8347 | -12.446 | 4 |
| Belgium | 1.0079 | 173943.2703 | 23768.92 | 20000 | 21000 | 1.4631 | -12.5257 | 5 |
| Canada | 0.9894 | 130706.8345 | 24291.04 | 174990 | 237639 | 0.8271 | 3.739579 | 1 |
| Denmark | 0.9756 | 1460321.573 | 31898.79 | 47642.86 | 44981.47 | 0.7636 | -11.3941 | 4 |
| Finland | 0.9007 | 2143555.863 | 31286.19 | 18320.29 | 52109.17 | 0.6747 | -9.11721 | 2 |
| France | 0.9098 | 140643.8536 | 24066.72 | 244668.3 | 445091.1 | 0.5019 | -12.3176 | 3 |
| Germany | 0.8446 | 8742.606422 | 24935.13 | 235259.2 | 541861 | 0.5793 | -14.7858 | 4 |
| Greece | 0.9529 | 96418.35724 | 10421.68 | 15890 | 6093.8 | 0.5473 | -16.72 | 2 |

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|---|---|---|---|---|---|---|---|---|---|
| Iceland | 0.9578 | 1200785.476 | 28222.7 | 477.7395 | 663.1641 | 0.7186 | -5.14861 | 2005.536 | |
| Ireland | 0.9991 | 4368738.11 | 22998.25 | 72815.42 | 27925.26 | 1.6423 | -9.7999 | 13267.89 | |
| Italy | 0.8935 | 464313.3676 | 22462.06 | 108638.5 | 180275.2 | 0.4709 | -11.0374 | 218903.7 | |
| Japan | 1.0533 | 526888.7386 | 26263.69 | 46115.46 | 278442.1 | 0.1897 | 5.084647 | 721705.8 | |
| Korea, Republic of | 1.0125 | 2788.482816 | 9514.687 | 29106.22 | 26833.2 | 0.6760 | 5.979707 | 56388.92 | |
| Mexico | 1.0294 | 257063.7728 | 3534.73 | 78060 | 8273.376 | 0.5755 | 18.53665 | 55333.06 | |
| Netherlands | 0.866 | 159045.8645 | 24481.35 | 192228.2 | 305461.1 | 1.5670 | -10.5746 | 658.2969 | |
| New Zealand | 0.8501 | 121658.7275 | 14878.38 | 32875.38 | 8491.035 | 0.6404 | -11.5805 | 52567.73 | 17 |
| Norway | 0.9942 | 617861.8659 | 36766.52 | 29429.69 | 34026 | 0.7143 | 2.40333 | 36474.9 | |
| Portugal | 0.9307 | 257063.7728 | 9463.024 | 26910.42 | 19793.15 | 0.6601 | -13.7751 | 22647.43 | |
| Spain | 0.9111 | 270883.7016 | 16360.43 | 125360.9 | 129193.6 | 0.5519 | -9.96223 | 106129.5 | |
| Sweden | 1.0215 | 249761.6577 | 32324.87 | 73300.82 | 123256 | 0.7988 | -7.63586 | 69185.35 | |
| Switzerland | 0.8838 | 1502661.135 | 35933.2 | 75994.87 | 232160.7 | 0.7855 | -10.5406 | 30243.23 | |
| Turkey | 1.1435 | 9277902 | 3048.113 | 18222 | 3668 | 0.3873 | 0.37407 | 30543.27 | |
| United Kingdom | 0.9844 | 399612.3282 | 20706.46 | 385145.9 | 897845.4 | 0.5372 | -6.37349 | 274492.6 | |
| United States | 0.9832 | 191200.3323 | 26807.41 | 955726 | 1316247 | 0.2507 | 2.644401 | 1327129 | |
| Australia | 1.0318 | 231933.6712 | 23675.62 | 111138.7 | 109602.3 | 0.9108 | -7.24953 | 36567.87 | |
| Austria | 0.5852 | 724915.9995 | 26516.96 | 31164.88 | 28510.59 | 0.9108 | -1.06163 | 40231.61 | |
| Belgium | 0.9319 | 160081.272 | 24592.04 | 21000 | 22000 | 1.6635 | -0.83686 | 49454.54 | |
| Canada | 1.046 | 121796.4792 | 25321.77 | 212715.6 | 250692.6 | 0.8540 | -2.83262 | 134726.7 | |
| Denmark | 0.9981 | 1330608.906 | 32898.9 | 45916.45 | 45825.32 | 0.8707 | -0.41543 | 40219.37 | |
| Finland | 0.9697 | 1900219.658 | 32780.35 | 24272.57 | 52225.24 | 0.7746 | 0.047747 | 24781.63 | |
| France | 0.9177 | 127087.941 | 24881.28 | 259775.4 | 508861.5 | 0.5623 | -0.8327 | 304712.5 | |
| Germany | 0.9342 | 8697.306704 | 25721.52 | 271610.7 | 617760.6 | 0.6640 | -1.536 | 361074 | |
| Greece | 0.9585 | 96595.65092 | 10851.63 | 14112.8 | 7020.42 | 0.6322 | -1.5436 | 22634.13 | |
| Iceland | 1.0372 | 1097345.758 | 29177.05 | 497.4734 | 842.8363 | 0.7443 | -13.068 | 2037.157 | |
| Ireland | 0.9716 | 4667449.302 | 24795.22 | 127088.7 | 40819.08 | 1.8273 | 2.398205 | 13314.44 | |
| Italy | 0.9309 | 533385.2068 | 23231.58 | 121169.8 | 182374.9 | 0.5318 | 0.022414 | 202439.5 | |
| Japan | 1.0245 | 636731.3487 | 26971.01 | 50322.02 | 300113.8 | 0.2052 | -16.9575 | 788208.7 | |
| Korea, Republic of | 0.9779 | 2856.44203 | 10251.21 | 38109.8 | 19970 | 0.7427 | -9.99469 | 63752.09 | |
| Mexico | 1.0709 | 245571.6044 | 3713.656 | 97170.2 | 12077.5 | 0.5825 | 11.16789 | 67673.88 | |
| Netherlands | 1.0716 | 168287.6216 | 25304.26 | 243732.6 | 332154.2 | 1.5002 | 1.988112 | 663.4892 | |
| New Zealand | 1.0514 | 112649.8122 | 15088.68 | 24893.8 | 7174.851 | 0.6047 | -3.70084 | 65759.54 | |
| Norway | 1.0877 | 580673.0386 | 37741.77 | 30265.02 | 37466 | 0.7596 | -0.41314 | 34278.17 | |
| Portugal | 1.0016 | 245571.6044 | 9785.047 | 32043.19 | 22264.94 | 0.7041 | 0.773936 | 21764.95 | |
| Spain | 0.9593 | 252396.3338 | 17049.58 | 156348.2 | 143580.3 | 0.6120 | 1.018418 | 99834.09 | |
| Sweden | 0.9995 | 266559.6451 | 33700.75 | 93995.08 | 123275.5 | 0.8689 | -7.61015 | 63862.08 | |
| Switzerland | 1.0529 | 1477511.641 | 37045.81 | 86804.22 | 252236.7 | 0.8714 | 0.820832 | 27992.71 | |
| Turkey | 1.039 | 9834008 | 3222.325 | 19204 | 4581 | 0.4319 | -19.5632 | 31257.83 | |
| United Kingdom | 1.0626 | 380520.2379 | 21418.84 | 438631 | 869700.4 | 0.5710 | -3.16054 | 275326.8 | |
| United States | 1.1203 | 190154.0031 | 27483.83 | 1256867 | 1460352 | 0.2713 | 2.955402 | 1411822 | |
| Australia | 1.0039 | 231660.5668 | 24268.64 | 111739.2 | 114888.2 | 0.9471 | 6.62346 | 35899.72 | |
| Austria | 0.8799 | 715442.9374 | 26624.35 | 34999.31 | 42484.66 | 0.9471 | 6.026019 | 41054.81 | |
| Belgium | 1.0085 | 160475.7043 | 24704.05 | 22000 | 200970 | 1.6608 | 6.526908 | 50449.66 | |

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|---|---|---|---|---|---|---|---|
| Canada | 1.081 | 125089.7084 | 25518.69 | 213756.8 | 275698.9 | 0.8134 | -0.21026 |
| Denmark | 1.0442 | 1342426.75 | 33014.83 | 43458.97 | 57412.93 | 0.8783 | 7.127228 |
| Finland | 1.0504 | 1890953.996 | 33564.43 | 24070.26 | 63933.2 | 0.7332 | 4.681382 |
| France | 1.0834 | 131030.5948 | 25194.34 | 295323 | 586367.4 | 0.5509 | 6.670561 |
| Germany | 0.9749 | 7922.978114 | 26017.87 | 272153 | 695765.5 | 0.6761 | 5.89812 |
| Greece | 1.0586 | 104687.2064 | 11306.37 | 13941.25 | 9000.988 | 0.6122 | 9.555606 |
| Iceland | 1.117 | 1117350.18 | 30064.25 | 686.2749 | 1257.334 | 0.7866 | 11.36057 |
| Ireland | 1.118 | 4095485.152 | 25865.14 | 134052.5 | 58882.38 | 1.8432 | 10.33593 |
| Italy | 1.0393 | 504584.0691 | 23570.14 | 113434.5 | 194496 | 0.5281 | 7.216452 |
| Japan | 0.9538 | 681762.3728 | 26977.84 | 50318.66 | 304236.9 | 0.2049 | -5.47356 |
| Korea, Republic of | 1.1272 | 2898.759492 | 10581.34 | 53210 | 20730 | 0.6922 | 5.949138 |
| Mexico | 1.099 | 225205.287 | 3664.217 | 140358.6 | 12868.7 | 0.5225 | 5.898252 |
| Netherlands | 1.1059 | 170923.7223 | 25653.14 | 282881.7 | 396530.1 | 1.5431 | 8.975857 |
| New Zealand | 1.1028 | 115711.1793 | 15478.36 | 20925.4 | 9425.379 | 0.5469 | 8.711234 |
| Norway | 1.1162 | 609102.3794 | 38265.16 | 32669 | 47076 | 0.7459 | 10.52343 |
| Portugal | 1.0985 | 225205.287 | 9924.46 | 36023.23 | 21325.2 | 0.6781 | 10.56933 |
| Spain | 1.0664 | 257479.2803 | 17478.91 | 177253.6 | 163588.9 | 0.5957 | 8.306848 |
| Sweden | 1.0252 | 196007.1955 | 33957.43 | 91941.99 | 146507.1 | 0.8631 | 5.816883 |
| Switzerland | 1.1191 | 1470986.317 | 37235.63 | 88765.69 | 292203.8 | 0.8693 | 8.367171 |
| Turkey | 1.2374 | 10147524 | 2937.284 | 19677 | 5847 | 0.5076 | 12.63967 |
| United Kingdom | 1.1406 | 424693.538 | 21841.17 | 506685.6 | 994136.3 | 0.5654 | 8.192816 |
| United States | 1.0717 | 205964.5727 | 27394.69 | 1343987 | 1616548 | 0.2491 | 2.21972 |
| Australia | 0.9512 | 251895.5157 | 24720.39 | 141136.1 | 161949.4 | 0.9332 | 20.55098 |
| Austria | 2.4071 | 734656.5547 | 26703.27 | 44895.47 | 55961.32 | 0.9332 | 20.5524 |
| Belgium | 0.9814 | 173880.8994 | 24978.86 | 229513 | 306288 | 1.6038 | 21.49352 |
| Canada | 0.931 | 135342.1245 | 25995.15 | 225892 | 318954.7 | 0.7871 | 14.15935 |
| Denmark | 0.9735 | 1460303.339 | 33062.33 | 53116.36 | 68608.6 | 0.8862 | 21.35795 |
| Finland | 0.9753 | 2017012.506 | 34031.27 | 33987.07 | 76049.58 | 0.7138 | 14.88842 |
| France | 1.0101 | 147395.1855 | 25287.07 | 385178.8 | 724219 | 0.5252 | 20.75105 |
| Germany | 0.9045 | 8907.213121 | 25990.62 | 297785.2 | 830718.6 | 0.6689 | 20.139 |
| Greece | 1.0008 | 122525.8066 | 11720.33 | 15560.6 | 12336.98 | 0.5569 | 27.70038 |
| Iceland | 1.0263 | 1218980.724 | 29804.61 | 797.8655 | 1733.427 | 0.7331 | 21.05555 |
| Ireland | 1.0957 | 3918332.894 | 27056.69 | 182897.4 | 73322.17 | 1.7082 | 26.33794 |
| Italy | 0.9418 | 575929.7572 | 23535.99 | 130819 | 238887.5 | 0.5049 | 21.21809 |
| Japan | 0.9542 | 711103.0668 | 27008.14 | 78140.12 | 335499.5 | 0.2142 | 7.335905 |
| Korea, Republic of | 0.986 | 2934.263036 | 11260.59 | 62660 | 24990 | 0.6478 | 8.122686 |
| Mexico | 0.9447 | 248611.5167 | 3649.005 | 164080.4 | 16587 | 0.5056 | -4.99296 |
| Netherlands | 1.0959 | 191927.5361 | 25540.38 | 349968.9 | 523206.4 | 1.4668 | 24.01872 |
| New Zealand | 1.095 | 127460.7196 | 16059.46 | 30194.7 | 11883.31 | 0.5435 | 28.00424 |
| Norway | 1.0174 | 686278.1575 | 38605.57 | 42781.06 | 57083 | 0.6888 | 17.65108 |
| Portugal | 1.0945 | 248611.5167 | 9935.751 | 44636.74 | 34443.26 | 0.6425 | 29.37719 |
| Spain | 1.0097 | 281308.0721 | 17712.68 | 257105.7 | 221020.6 | 0.5678 | 23.37463 |
| Sweden | 1.0723 | 232530.4849 | 34629.94 | 119367.5 | 185732.6 | 0.8235 | 18.31205 |
| Switzerland | 1.0815 | 1611999.98 | 37123.38 | 124805.3 | 341372.8 | 0.8217 | 17.49775 |

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|---|---|---|---|---|---|---|---|---|---|
| Turkey | 0.6935 | 10492427 | 3126.334 | 18795 | 6138 | 0.4880 | 19.83292 | 29600.93 | |
| United Kingdom | 1.056 | 545653.5897 | 22194.11 | 523319.5 | 1187046 | 0.5478 | 14.67799 | 318599.5 | |
| United States | 0.953 | 252024.1413 | 27550.56 | 1327170 | 1769613 | 0.2425 | 2.729863 | 1617133 | |
| Australia | 0.9522 | 310062.5352 | 25391.47 | 199340.7 | 203775.8 | 0.9370 | 19.03768 | 47522.89 | |
| Austria | 1.0147 | 865906.682 | 26856.67 | 57636.38 | 69806.06 | 0.9370 | 14.34247 | 36567.87 | |
| Belgium | 0.9568 | 212622.8684 | 25115.47 | 351499 | 370687 | 1.5753 | 15.15507 | 71342.62 | |
| Canada | 0.9014 | 164547.8306 | 26206.7 | 289140.4 | 372670.3 | 0.7248 | 11.66083 | 170169.3 | |
| Denmark | 0.9704 | 1803530.864 | 33090.96 | 65840.27 | 95113.5 | 0.8444 | 14.52505 | 56353.13 | |
| Finland | 0.9685 | 2442118.015 | 34543.18 | 50256.53 | 85022.5 | 0.7014 | 9.805737 | 35831.58 | |
| France | 0.9363 | 193457.551 | 25386.05 | 527583.2 | 845368.7 | 0.5012 | 13.451 | 427919.7 | |
| Germany | 1.1238 | 10967.71164 | 25906.82 | 394512.5 | 925095.3 | 0.6732 | 12.88053 | 470467.2 | |
| Greece | 0.9549 | 157377.6782 | 12286.08 | 22453.6 | 13791.27 | 0.5334 | 19.66977 | 33184.16 | |
| Iceland | 0.9326 | 1507108.925 | 30360.64 | 1193.267 | 4039.728 | 0.7166 | 15.07017 | 2856.641 | |
| Ireland | 1.0244 | 4229098.16 | 27703.37 | 222837.3 | 106692 | 1.5161 | 17.34138 | 23806.87 | |
| Italy | 1.0085 | 643760.1377 | 23405.92 | 180890.6 | 280481.1 | 0.4856 | 14.67335 | 296762.8 | |
| Japan | 0.9436 | 700323.1604 | 27354.34 | 89729.23 | 370543.6 | 0.2239 | 7.291141 | 763391.3 | |
| Korea, Republic of | 0.9348 | 3019.639444 | 11556.33 | 66070 | 32170 | 0.6847 | 7.635305 | 83967.95 | |
| Mexico | 0.905 | 311038.2627 | 3659.473 | 180555.3 | 21672.6 | 0.5217 | 4.498726 | 82847.57 | |
| Netherlands | 0.9541 | 225109.7777 | 25499.14 | 426610.9 | 587252.1 | 1.4413 | 14.13443 | 544.3582 | |
| New Zealand | 0.9455 | 156407.1739 | 16409.69 | 44327.44 | 13957.1 | 0.6185 | 21.07174 | 58215.1 | |
| Norway | 0.9616 | 883632.9675 | 38748.27 | 48967.07 | 80932 | 0.6762 | 13.47674 | 40903.97 | |
| Portugal | 1.0485 | 311038.2627 | 9790.546 | 60584.31 | 43940.69 | 0.6254 | 19.48595 | 31747.08 | |
| Spain | 0.9924 | 328122.448 | 17994.06 | 339651.9 | 282294.4 | 0.5502 | 16.94047 | 153401.5 | |
| Sweden | 1.0677 | 303008.2892 | 35111.92 | 158884.2 | 214586.8 | 0.8075 | 10.15961 | 85540.81 | |
| Switzerland | 0.9106 | 1860893.346 | 36755.22 | 162232.8 | 400589.6 | 0.8152 | 10.79662 | 39167.74 | |
| Turkey | 0.8402 | 10987209 | 3263.057 | 33537 | 7060 | 0.4703 | 16.59311 | 36967.27 | |
| United Kingdom | 0.928 | 660151.0201 | 22703.68 | 606157.6 | 1247190 | 0.5329 | 20.15779 | 380129.7 | |
| United States | 0.836 | 289039.1313 | 27970.67 | 1395159 | 2160844 | 0.2453 | 3.753454 | 1741001 | |
| Australia | 0.974 | 359624.5181 | 25792.12 | 263389.4 | 175540.6 | 1.0001 | 11.05457 | 53835.96 | |
| Austria | 1.0669 | 992229.8096 | 27304.9 | 70713.75 | 71806.89 | 1.0001 | 2.578073 | 35899.72 | 37 |
| Belgium | 0.9211 | 244728.1142 | 25738.36 | 466548 | 478170.2 | 1.6331 | 3.615831 | 81926.83 | |
| Canada | 0.8887 | 188921.7932 | 26730.24 | 315262.5 | 388316.9 | 0.7253 | 12.73339 | 190156.3 | |
| Denmark | 0.9994 | 2065523.497 | 33700.9 | 82504.74 | 110165 | 0.8584 | 4.126994 | 64934.79 | |
| Finland | 0.9606 | 2745214.903 | 35726.83 | 57379.14 | 81860.51 | 0.7305 | 0.397019 | 41501.68 | |
| France | 0.9133 | 230766.1743 | 25835.26 | 641760.9 | 868469.9 | 0.5132 | 2.420476 | 489911 | |
| Germany | 1.0133 | 13233.60798 | 26160.8 | 512066.2 | 927459 | 0.7178 | 1.117444 | 516362.1 | |
| Greece | 1.009 | 184978.2397 | 12824.37 | 28481.53 | 13601.94 | 0.5399 | 5.564944 | 39346.38 | |
| Iceland | 0.9538 | 1727825.272 | 32309.01 | 2087.893 | 10091.41 | 0.7386 | 20.58511 | 3318.941 | |
| Ireland | 0.9719 | 4605935.545 | 28331.25 | 207646.8 | 104152.2 | 1.5267 | 4.334943 | 28513.9 | |
| Italy | 0.9433 | 721975.7811 | 23539.94 | 220720.3 | 293475.2 | 0.4999 | 3.027691 | 342997.3 | |
| Japan | 0.9572 | 758223.93 | 28078.2 | 96984.25 | 386581.3 | 0.2467 | -3.91758 | 826932.9 | |
| Korea, Republic of | 0.9774 | 3103.573227 | 12051.1 | 87770 | 38680 | 0.7761 | 13.84934 | 96154.59 | |
| Mexico | 0.9277 | 357192.0645 | 3772.067 | 204214.2 | 29641 | 0.5509 | 16.08215 | 81596.56 | |
| Netherlands | 0.9222 | 258579.4536 | 25944.98 | 477218.9 | 615726.8 | 1.5367 | 3.236608 | 581.9583 | |

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|---|---|---|---|---|---|---|---|
| New Zealand | 0.9155 | 178959.8505 | 16859.34 | 52640.12 | 11584.46 | 0.6780 | 12.6764 |
| Norway | 0.923 | 1044299.169 | 39963.74 | 79395 | 92923 | 0.7053 | 19.24894 |
| Portugal | 0.888 | 357192.0645 | 9876.188 | 66970.55 | 41965.47 | 0.6464 | 4.82353 |
| Spain | 0.9723 | 366446.2094 | 18312.57 | 407472.3 | 305426.6 | 0.5588 | 5.913201 |
| Sweden | 1.0048 | 392156.0281 | 36362.86 | 196168.4 | 208776.9 | 0.8448 | -0.8751 |
| Switzerland | 0.8803 | 2198167.271 | 37407.97 | 197678.9 | 431980.1 | 0.8577 | 0.224262 |
| Turkey | 0.825 | 11713709 | 3507.904 | 38523 | 8315 | 0.4974 | 14.48379 |
| United Kingdom | 0.8965 | 738811.5324 | 23329.83 | 701913.4 | 1198637 | 0.5327 | 2.476001 |
| United States | 0.9048 | 304000.6467 | 28708.47 | 1520316 | 2241656 | 0.2644 | 4.344612 |
| Australia | 0.9817 | 375705.1186 | 26239 | 213529.5 | 225479.1 | 1.0407 | 4.634944 |
| Austria | 1.4915 | 1132754.196 | 27706.99 | 82551.39 | 105696.6 | 1.0407 | 3.548472 |
| Belgium | 1.4459 | 257676.0365 | 26036.36 | 378156.4 | 618532 | 1.6950 | 3.93734 |
| Canada | 2.4092 | 195331.5426 | 27270.32 | 341629.9 | 450312.4 | 0.7189 | 12.03008 |
| Denmark | 38.5067 | 2150812.928 | 34638.01 | 94031.94 | 124626.6 | 0.9307 | 4.244847 |
| Finland | 0.2843 | 2789633.388 | 36651.87 | 54801.84 | 96207.62 | 0.7929 | 2.153583 |
| France | 0.1254 | 245790.4293 | 26106.72 | 628016.7 | 1044444 | 0.5298 | 4.127606 |
| Germany | 0.1248 | 16302.83945 | 26357.64 | 475996.2 | 1081317 | 0.7682 | 1.868732 |
| Greece | 5.0461 | 201671.3923 | 13290.21 | 29189.32 | 22417.99 | 0.5290 | 7.23925 |
| Iceland | 16.3379 | 1777694.871 | 34108.04 | 4708.654 | 13715.46 | 0.7550 | -3.6507 |
| Ireland | 9.7116 | 4552187.814 | 29436.71 | 163530 | 120728.1 | 1.5119 | 5.224201 |
| Italy | 1.1409 | 844865.5589 | 23418.43 | 224079.3 | 378931.4 | 0.5196 | 3.434163 |
| Japan | 0.4644 | 844137.5893 | 28606.78 | 100898.5 | 449567 | 0.2728 | -7.64289 |
| Korea, Republic of | 0.3326 | 3270.910936 | 12504.16 | 104880 | 49190 | 0.7583 | 9.139826 |
| Mexico | 0.0166 | 366009.0552 | 3838.032 | 226136.3 | 36446.5 | 0.5597 | 8.422292 |
| Netherlands | 0.347 | 302012.5728 | 26215.47 | 451234.1 | 757870.7 | 1.5799 | 4.161264 |
| New Zealand | 18.518 | 185449.1991 | 17114.3 | 52229.88 | 12824.8 | 0.7274 | -6.88818 |
| Norway | 10.1131 | 1130169.626 | 40738.43 | 76322 | 120458 | 0.7280 | 14.32011 |
| Portugal | 4.3461 | 366009.0552 | 9892.764 | 63339.75 | 53983.73 | 0.6595 | 6.751654 |
| Spain | 1.044 | 375604.7638 | 18721.62 | 384538.5 | 413605.5 | 0.5664 | 6.835952 |
| Sweden | 1.8338 | 482985.9112 | 37363.43 | 171818.4 | 265544.2 | 0.8973 | 3.41065 |
| Switzerland | 0.2689 | 2277288.719 | 38075.02 | 170156.3 | 559949.6 | 0.9119 | 1.137943 |
| Turkey | 0.7385 | 12450257 | 3718.161 | 71299 | 8866 | 0.4721 | 6.671187 |
| United Kingdom | 0.0824 | 787417.8565 | 23639.57 | 840652 | 1454904 | 0.5627 | 5.985391 |
| United States | 1.032 | 322771.0704 | 29303.71 | 1634121 | 2477268 | 0.2780 | 4.385468 |
| Australia | 1 | 399205.4938 | 26768.72 | 260902.6 | 289516 | 1.0831 | 22.1072 |
| Austria | 0.654 | 1278682.021 | 28484.27 | 111072.3 | 156042.5 | 1.0831 | 15.95231 |
| Belgium | 0.7328 | 273867.6152 | 26633.82 | 481355.9 | 748165 | 1.7145 | 16.27168 |
| Canada | 0.4417 | 209510.0301 | 27746.67 | 376425 | 521652.7 | 0.6961 | 12.58521 |
| Denmark | 0.0261 | 2270800.066 | 35763.23 | 107981.9 | 143263.5 | 1.0091 | 15.37972 |
| Finland | 3.3684 | 2912283.379 | 38350.55 | 70568.68 | 115813.7 | 0.8543 | 12.28913 |
| France | 8.1733 | 267464.6575 | 26464.73 | 762123.9 | 1291577 | 0.5478 | 14.94954 |
| Germany | 8.5204 | 16646.48048 | 27118.62 | 591460.6 | 1294453 | 0.8503 | 14.4909 |
| Greece | 0.1901 | 222402.3568 | 13818.64 | 41287.97 | 31650.13 | 0.5596 | 21.44409 |
| Iceland | 0.0513 | 1863384.659 | 34342.65 | 7667.367 | 27590.29 | 0.8206 | 21.96196 |

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|---|---|---|---|---|---|---|---|---|
| Ireland | 0.1137 | 4362579.561 | 30513.46 | 156491.3 | 145861.5 | 1.4908 | 19.10081 | 34235.23 |
| Italy | 0.8514 | 951772.9648 | 23720.39 | 294876.5 | 520083.9 | 0.5629 | 15.30961 | 375416.7 |
| Japan | 1.9463 | 945643.7719 | 29292.08 | 107633.5 | 542614 | 0.3098 | -2.3397 | 779912.6 |
| Korea, Republic of | 3.3813 | 3438.066738 | 13073.65 | 119140 | 74780 | 0.7798 | 3.753375 | 138146.2 |
| Mexico | 66.6592 | 393154.2476 | 3980.295 | 245452.6 | 44702.8 | 0.5765 | 6.15125 | 99276.63 |
| Netherlands | 2.7011 | 336731.7568 | 26883.12 | 513301 | 876917.8 | 1.6445 | 15.96455 | 643.6572 |
| New Zealand | 0.055 | 195004.7965 | 17203.73 | 63054.57 | 15065.91 | 0.7053 | 27.16873 | 75316.93 |
| Norway | 0.1076 | 1232282.878 | 41254.67 | 95688 | 143051 | 0.7479 | 20.91478 | 74088.31 |
| Portugal | 0.2421 | 393154.2476 | 9962.873 | 88460.97 | 67707.74 | 0.7023 | 22.25063 | 40309.92 |
| Spain | 0.9368 | 392427.3531 | 19212.78 | 460583.5 | 590585.5 | 0.5919 | 18.31701 | 222716 |
| Sweden | 0.5663 | 530917.4091 | 38692.55 | 227329 | 327333.1 | 0.9484 | 14.2816 | 103338.6 |
| Switzerland | 3.5978 | 2432184.782 | 39100.59 | 264943 | 657905.3 | 0.9714 | 7.89236 | 43982.71 |
| Turkey | 0.9766 | 13205402 | 3894.636 | 95078 | 12210 | 0.5025 | 21.57636 | 65473.09 |
| United Kingdom | 12.1849 | 947365.118 | 24186.68 | 1139155 | 1841018 | 0.6022 | 19.63478 | 525622.8 |
| United States | 0.9305 | 370685.8736 | 29848.15 | 1840463 | 2916930 | 0.2912 | 3.803804 | 2098112 |
| Australia | 1 | 458390.1045 | 27516.39 | 341656.5 | 289516 | 1.1331 | -164.802 | 67559.08 |
| Austria | 0.9695 | 1429709.702 | 29323.69 | 163403 | 156042.5 | 1.1331 | -153.259 | 53835.96 |
| Belgium | 0.968 | 310062.9612 | 27202.06 | 592973.4 | 748165 | 1.7463 | -158.689 | 101705.7 |
| Canada | 0.9358 | 245893.4834 | 28208.79 | 497203.7 | 521652.7 | 0.6736 | -153.417 | 276019.2 |
| Denmark | 0.9336 | 2599120.768 | 36322.25 | 120460.7 | 143263.5 | 1.0246 | -157.546 | 80609.68 |
| Finland | 0.9593 | 3316145.147 | 39884.11 | 92147.82 | 115813.7 | 0.8638 | -116.124 | 52608.85 |
| France | 0.9549 | 312302.6124 | 26814.9 | 950335.6 | 1291577 | 0.5489 | -149.275 | 599385.7 |
| Germany | 0.9504 | 20317.07127 | 27809.38 | 675532.2 | 1294453 | 0.8681 | -144.87 | 596246.4 |
| Greece | 0.9684 | 260872.1835 | 14339.78 | 53220.81 | 31650.13 | 0.5652 | -196.659 | 52100.12 |
| Iceland | 1.0433 | 2114482.216 | 33833.42 | 12765.82 | 27590.29 | 0.7996 | -179.107 | 4946.202 |
| Ireland | 1.0028 | 4380378.267 | 31399.4 | 193450 | 145861.5 | 1.4817 | -187.27 | 41368.26 |
| Italy | 0.9572 | 1049239.043 | 23934.92 | 364839.2 | 520083.9 | 0.5826 | -147.602 | 416577.3 |
| Japan | 0.8539 | 1019354.376 | 29926.37 | 132850.9 | 542614 | 0.3355 | -114.875 | 784835.9 |
| Korea, Republic of | 0.8869 | 3647.765363 | 13667.69 | 119630 | 74780 | 0.8234 | -145.956 | 154168.5 |
| Mexico | 0.9072 | 453318.1333 | 4067.063 | 272730.6 | 44702.8 | 0.5844 | -204.359 | 104636.7 |
| Netherlands | 0.9929 | 388475.0071 | 27693.55 | 724074.1 | 876917.8 | 1.8012 | -168.1 | 762.9956 |
| New Zealand | 0.9207 | 223338.2491 | 17551.76 | 70941.73 | 15065.91 | 0.7673 | -177.262 | 67498.64 |
| Norway | 0.952 | 1437915.519 | 42054.94 | 121616 | 143051 | 0.7559 | -195.164 | 89599.09 |
| Portugal | 0.9484 | 453318.1333 | 10142.24 | 115314.4 | 67707.74 | 0.7292 | -206.611 | 45234.74 |
| Spain | 0.9792 | 431036.3377 | 19733.92 | 605138.2 | 590585.5 | 0.5976 | -165.292 | 262818.4 |
| Sweden | 0.9554 | 657277.165 | 39490.33 | 289988.8 | 327333.1 | 0.9750 | -125.738 | 117294 |
| Switzerland | 0.9663 | 2802331.731 | 40134.46 | 337533.4 | 657905.3 | 1.0256 | -141.14 | 46378.97 |
| Turkey | 0.8314 | 13834863 | 4040.673 | 157649 | 12210 | 0.4894 | -165.281 | 80177.55 |
| United Kingdom | 0.8076 | 1016897.317 | 24808.6 | 1263652 | 1841018 | 0.5622 | -182.521 | 592352.5 |
| United States | 0.8894 | 413500.0101 | 30206.29 | 2109876 | 2916930 | 0.3011 | -146.827 | 2228921 |