

Journal of Economics Library

www.kspjournals.org

Volume 7

December 2020

Issue 4

David vs. Diversification: Ricardian trade theory compared to financial principles, in varied designs

By Todd J. BARRY †

Abstract. The purpose of this article is to assess the extent, if any, to which trade leads to specialization, as hypothesized by the 19th Century economist David Ricardo, or diversification, as under financial principles, and if so, when does the transition between the two occur? What other political-economic factors lead to diversifying versus specializing trade as related to risk? Were these factors present in the great rise of international trade, during the 19th Century food blights and Corn Laws? Methodologically, this article uses: historical documents, a simple game theory model, an analysis of post-World War II crises, qualitative cases of risk-reducing institutions with descriptive statistics, and a statistical regression of randomly chosen countries, explaining diversification deductively. The results show that: contrary to orthodox, “Ricardian” trade theory, trade is risky, and causes expansion into diverse firms. But, countries may then turn towards specialization, as larger economic nations may be better able to take-on risks. Still, such states may turn immobile institutionally, while organizations and diversified supply chains have helped mollify international crises. Additionally, the discussion indicates that countries may also trade similar goods, called intra-industry trade, which reduces risk, and also intermediate goods. The conclusion addresses policies for reducing risk in trade.

Keywords. International trade, Diversification, Ricardo, Risk, International Monetary Fund. JEL. B1, B50, F11, F13, G10.

1. Introduction

The purpose of this article is to explain how and why David Ricardo’s theory of competitive advantage, more properly known as comparative advantage, conflicts with principles of financial risk and diversification. And, it addresses the many ways in which countries can adapt to risk in trade. David Ricardo (1817) showed that countries should specialize in those products for which they are best at. This depends on resources and productivity, and what is easiest and cheapest to make compared to other goods (opportunity cost). Ricardo’s idea differed from Adam Smith’s prior theory of absolute advantage, which failed to consider opportunity costs. Swedish economists Heckscher & Ohlin (1919) and Ohlin (1933) built on Ricardo’s work, showing that countries can tell where their factors are strongest, and produce as such. Later, Stolper & Samuelson (1941) showed that trade causes uneven benefits. More recent works on trade include those on intra-industry trade by Grubel & Lloyd (1975), and Krugman (1981) and Helpman (1981), who examined distances and economies of scale of larger firms. This article also discusses trade within

† University of Southern Mississippi, 730 East Beach Blvd., Long Beach, MS 39560, USA.

✉. tjbarry00@yahoo.com

Journal of Economics Library

multi-industries, called “intra-industry trade,” “vertical trade”- or “intermediate goods”- to evaluate Ricardo’s theories while addressing other issues between trade and risk.

1.1. Background

David Ricardo’s theories were in large part a response to the Napoleonic Wars that shook Europe in the early 1800s, pitting England versus France. These countries, even from earlier times, had large tariffs across the English Channel, known as the “Corn Laws.” Previously, in the Middle Ages, countries competed solely against each other in a zero-sum game, described by the economist and philosopher David Hume, and later on Adam Smith. Ricardo, though, showed that countries could form comparative advantages in goods using land, labor, or capital to make products more cheaply, and then trade, therefore benefitting the world economy more than if countries solely focused on their absolute advantages.

According to recent analysis by Wacziarg (2007), echoing the classical economists, as we shall see, the danger of excessive concentration, such as in agricultural goods, is that specialization can lead to supply and price shocks, such as from blights and droughts. Instead, diversification, the opposite policy, can be an insurance policy against such shocks. Diversification can also satisfy different consumer taste and preference changes. Still, concentration supports productivity and comparative advantages in trade. Wacziarg depicts a U-shaped curve using a Gini coefficient, which measures inequality as a proxy for diversification versus specialization. At first, technological convergence takes hold, creating a wide range of goods. But then, trade openness leads to specializing in a few goods, in accordance with Ricardo’s theories. As an alternative explanation he offers, countries experiment to determine where comparative advantage exists, causing the birth of multiple sectors early on in development, which can also be used as a buffer against risk (Wacziarg, 2007). This article uses a market based approach, includes a causal connection through a game theory model, analyses institutions long-term, verifies the data with an empirical qualitative section, and regresses numerous variables.

1.2. Research questions

Do firms specialize or do they diversify to enhance or reduce trade risks, respectively? Diversification is little researched, but Ricardo should have been better aware of it, as the son of a wealthy bond trader, and who dabbled in finance himself. By specializing only in comparatively advantaged goods, as Ricardo argued, countries expose themselves to greater risks, such as changes in: supply and demand, changes to terms of trade, or shocks to the economy, as written about later by John Maynard Keynes. Countries might be wiser to spread production across firms, industries, or products, a financial concept called diversification.

T.J. Barry, 7(4), 2020, p.141-175.

Journal of Economics Library

Since the studies cited using non-parametric statistics are beyond this article, this author regresses number of “enterprises” (y variable) by variables affecting diversification. Some author’s axes are labeled as showing curving “humps,” or a quadratic relationship, affected by a myriad variables, such as level of technology (Imbs & Wacziarg 2000), Gross Domestic Product (GDP), openness to trade (Saint-Paul, 1992), types of industry, types of trade, economic freedom, which also measures institutions, and “experimentation” by sectors, as in Hausmann & Rodrik (2003). Many other variables will be touched on here where data is available. The goal is to find the link between number of enterprises (diversification) (y) and these causal mechanisms (x), which can affect development policy, to push to diversify or specialize. Once open to trade, do countries specialize, as David Ricardo predicted, or diversify to lessen risks, and is this decision intuitive or incidence based? Why, also, did the majority of global trade arise in Europe after (rather than before) the Napoleonic Wars and potato blights, and what other historical factors have impacted risk, positively or negatively, in foreign trade?

1.3. Hypotheses

The initial hypothesis is that contrary to orthodox trade theory, countries, when open to trade (x variable), diversify into more sectors, industries, and firms, (y variable), so as to protect against the risk (x) of famines, drought, wars, shocks, and cyclicalities, with diversified trade (y) beginning in the mid-19th Century from the potato blight and Napoleonic Wars (x). Larger economic nations (x) are hypothesized to either be able to take greater risks, and specialize (y), through competitive intuition (shown in game theory), but they may conversely become set in their ways of mass production, so there may be a curvilinear relationship. The regressions seek to show that certain variables (x) cause diversification and greater enterprises (y), over from 1996-2007. Trade here is seen as mid-term since, most World Trade Organization (WTO) rounds last 10-15 years. The OECD (Organization for Economic Cooperation and Development) defines “enterprises” in a very narrow way, simply put as: “a legal entity possessing the right to do business on its own,” a short-term grouping, thus recent years are used. The article’s structure is a review of early empirical trade, to classical trade theory, to modern theory, then to the methods and results, then to discussing the future of different types of trade, concluding with policy recommendations.

1.4. Literature review: Early history

Historically, writes Bernstein (2008), humans have been trading nearly since their origins, building their first boats around 15,000 years ago, used for trading for obsidian flakes near the Balkans. This earliest trade was not “Ricardian” specialized, but an attempt to acquire different products. Humans may have also used water routes to reach the Middle East, and then began trading ax and copper weapons, for the grains of the Fertile

T.J. Barry, 7(4), 2020, p.141-175.

Journal of Economics Library

Crescent. Of help were the monsoon winds and camel use for shipping by sea and land, respectively (Bernstein, 2008). Diamond (2005) observes that civilizations relying on limited trade of essential goods have often met catastrophic fates. Thus, trade is important, but so is domestic production. Some scholars have written about early traders using micro techniques to avoid risk in transactions. Traders sent a relative to accompany trade journeys and make sure the compensation returned home safely (North, 1990). North even cites ancient historian Herodotus that early trade predated language, as traders used hand signals from an arm's length distance (North, 1990).

Several centuries later, Rome may have fallen because of the risky trading outflow of much of its metal currency, the reason why American President Richard M. Nixon removed gold as a reserve currency in the 1970s, a decision still controversial today. In the early Middle Ages, trade may have spread the lice that caused the black plague, causing health risks. Then, new explorations started by the likes of Marco Polo and by Arab traders initiated globalization, a period of increased contact, and opened up the Asian spice, silk, and dye trade. In the age of empires, countries traded to acquire gold and silver, so-called mercantilism. Countries typically sent smaller ships for exploration and conquest. It was less risky- the sinking of a smaller ship would result in the loss of less bounty, spread amongst the ships. Ayers (1962) also writes that humans developed steam engines with the intent of reducing the risks of rickety oar ships.

This Middle Ages led to the writings by gold hoarding mercantilists, followed by the Classical writings of Adam Smith. Smith believed in an absolute advantage to trade that could benefit one country at a time. Ironically, Smith once wrote, in his whimsical style, "...drought [in 'rice countries'] is, perhaps, scarce ever so universal as necessarily to occasion a famine, if the government would allow a free trade" (Burgess & Donaldson 2010). Only after the European revolutions and Enlightenment would come Ricardo's theories. Countries realized they could specialize and produce goods at a comparative advantage, with lower costs, benefiting society as a whole (Bernstein, 2008). Is it similarly just a coincidence that later, after World War II, the first joint European agreement was in regards to coal, a product risky to mine, and volatile as to when underground deposits are made, such as to reduce the risks of trading it?

1.5. Very early/Classical Theory

Ricardo's (1817) works led to graphs that were expanded upon by his successors, such as Heckscher & Ohlin (1919), Ohlin (1933), and Stolper & Samuelson (1941). The resulting production possibilities curve, also called the production frontier, shows how much of each good each country can produce. The frontier can either be a straight diagonal line connecting the two maximum amounts of each good, or curved downward, since some factors of production are sacrificed in switching from the production of one good to another. The second significant curve, the indifference curve,

T.J. Barry, 7(4), 2020, p.141-175.

Journal of Economics Library

indicates the quantity of each good people can consume to stay at the same point of utility, or happiness. The slope curves upward because to give up one good, consumers demand more of another, called diminishing marginal utility. The higher the indifference curves, or farther point from the origin, the greater the overall happiness. An equilibrium occurs when the two curves intersect. Ricardo showed that specialization and trade causes higher indifference curve, and a larger amount of goods produced, for greater happiness, assuming that more goods do bring happiness.

A number of influential studies have questioned Ricardo's arguments. One study, by Wassily Leontief (1953), concluded that the United States was exporting labor-intensive products. The United States should have been producing capital intensive products, intense in machinery, when in fact at that time it was producing labor-intensive products when it did not have low-paid workers. Subsequent studies criticized Leontief for using data from the time of World War II, since war can alter the statistical dynamics of an economy. Additionally, Leontief used only a simple, two factor model of labor and capital, and did not include "human capital," that of higher skills and education, needed to manufacture higher tech goods.

Linder (1961) followed by attempting to explain Leontief's study by looking at the fact that rich, developed countries tend to trade more among themselves. This fact is even true today, as some three-quarters of trade is amongst larger states, but such states never fully reach their total demand because of distance. Distance also reduces the knowledge of foreign markets and demand preferences. Economies of scale (lower costs) make producing goods in a single country more convenient. In short, as Linder (1961) shows, similar countries trade with each other because of similar consumers.

Still, many, such as Costanza *et al.* (1995), question the assumptions on which "Ricardian economics" is based. Ricardo assumes that trade creates no externalities such as pollution, that there are stable rather than constantly changing prices, that conditions such as production are constant, that there is no buying-power coercion by wealthy states, and that there is free movement of capital, labor, and other factors. If these assumptions change, the entire paradigm does as well. Economist Joseph Stiglitz (2006) has also been skeptical of the gains of globalization, the vast amount of trade due to progress in transportation and technology. However, many economists like Jeffrey Sachs since the 1980's have supported "neoliberalism," that trading abundantly brings everyone gains. Few scholars address risk.

World trade has increased from 4% of world Gross Domestic Product in the 1950s to over 60% as of 2014. But, with risk, it fell several percentage points in the 2008 financial crisis from lack of funding (The Economist Group "A Troubling" 2014). Laidi (2008) shows that from 1980 to 2005, world trade quadrupled; GDP, which uses exports, only doubled, meaning that countries were using financing for more imports. Trade can also be risky, from: dealing with diverse cultures, hidden barriers that link

T.J. Barry, 7(4), 2020, p.141-175.

Journal of Economics Library

domestic firms, transportation risks, blights, cyclicalities, and currency risks. But, currencies are safer as of the last two decades with “managed floats,” where governments only intervene in currencies in extreme cases. Freer trade has resulted in lower prices, a greater variety of products sold, better quality of products, greater competition resulting in all of these areas, and greater innovation, despite its drawbacks such as income inequality, and, at times, the outcomes of risk.

1.6. Modern theory

In more modern theories, Sawyer & Sprinkle (2009) summarize the ideas behind trade in the same industries, called intra-industry trade (ITT). A simple example would be wheat and corn. Intra-industry trade may reduce risks, often unnoted, but which is a theory offered here by the author. Balassa (1963) had initiated the literature on intra-industry trade through studies of European integration. Some industries such as machine and farm tools have very high Indexes of ITT, 0.996 and 0.878 respectively, because many kinds of tools are needed to work on global products. A unity of 1.000 for the index, developed by Grubel & Lloyd (1975) would indicate equal exporting and importing.

Other theoretical reasons for “ITT” trade are brand names, that consumers prefer fancier products from another country, such as “Perrier” water for example, or “faddish” or contemporary products. Fads are designed in one country and then make their way, through product standardization, across other countries through a product life-cycle that starts with large countries and moves to smaller ones (Grubel & Lloyd, 1975). Krugman (1981) added to the intra-industry trade theories, writing about how this type of trade will increase in the future, due to lower transportation costs and economies of scale of multinational firms; larger firms can reduce production costs from their size (Grieco & Ikenberry 2003). This refiguring can create oligopolies, which have market power to further differentiate goods (Grubel & Lloyd, 1975).

In the future, Williamson (2002) shows that diversification is needed to protect against droughts, blights, and other “acts of God,” and factories and other capital that can be destroyed. Earlier, Bigman & Reutlinger (1979) had noted that nature can be buffered by reserve stocks of commodities, although reserve stocks can increase future prices. Lin (2011) writes that outbreaks of pathogens or precipitation changes can be “buffered” by crop diversification, but state subsidies only usually apply to a certain crop.

Most importantly, as of 2020, the recent literature on trade and diversification, building on Ricardo and the others, stems from Imbs and Wacziarg (2000), and focuses on trade diversification in the last several decades. Consequently, this short period is used later in the regressions. Kalemli-Ozcan, Sorensen & Yosha (2003) and Koren & Tenreyro (2004) both find an increase in specialization once the country becomes large enough to bear the risks. Cadot et al., in a revised (2011) article, and Klinger & Lederman (2004, 2006), each discover a U shaped curve of first

T.J. Barry, 7(4), 2020, p.141-175.

Journal of Economics Library

diversification, then specialization, using inequality as the “y” variable. De Benedictis, Gallegati & Tamperi (2007) find no existence of U shaped curves, but perpetual diversification, completely undoing Ricardo. These curves look similar to a Kuznets Curve, which depicts income inequality across time. Of all of these studies, an untold count of differing variables are used to measure risk, concentration, and diversification versus specialization. One work, from the United Nations (U.N.) (2012), uses manufacturing goods, and still finds strong evidence of diversification. One might note, though, that larger countries might be more inclined to diversify and trade since they can take advantage of terms of trade effects, the ability to export more by putting pressure on smaller nations over prices. High income countries, too, have the capital to better adapt to globalization and diversify, which is part of the study here. These previous studies, however, are weak in their explanations of causality (U.N. “Diversification vs. specialization” 2012, 1-71). Finally, a Booz & Company study (Shediak, 2008) found that diversification reduces volatility, and even increases growth.

2. Methodology summation

Methodologically, this dissertation section is roughly chronological starting with qualitative process tracing. It considers changes in trade at the times of famines/blights. The article looks for examples in which riskiness, “acts of God,” or cyclicity caused diversification, such as Europe’s 19th Century potato blight, and how “game theory” might apply. The article then looks at countries with three types of economies affected by risk, and then chronologically at the international institutional framework since Bretton Woods in 1944, and how supply chains, affect risk. The article finishes method-wise with several statistical regressions to provide a test of numerous variables affecting risk in trade, and the levels when diversifying and specializing occur. Finally, the article discusses empirical evidence of intra-industry trade and intermediate parts, followed by brief policy recommendations.

To explain more thoroughly, the first methodological approach examines the early history of trade. Harvard’s libraries contain mid-1800s trade documents, which will be utilized, to help explain trade, historically. The analysis draws on the works of Richard Fogel, who combined historical analysis with quantitative methods. This part will therefore use historical processing tracing, which tests causal mechanisms at different, historical steps for a diversification explanation (George & Bennett, 2005). Qualitative studies are valuable in showing causal mechanisms (George & Bennett, 2005).

The second methodology is a simple model of game theory, a conceptual model to compare countries’ decision-making in case of crises.

The third methodology uses a post-WWII analysis in three countries, Japan, Finland, and Australia, chosen because they have three different types of economies, concentrated in the areas of capital, cyclicity, and

T.J. Barry, 7(4), 2020, p.141-175.

agriculture, respectively, and because none were used in any of the regressions which come later. These three cases of shocks convinced states to diversify their economies.

A fourth methodology analyzes global institutions in times of major financial crises, descriptively.

The fifth methodology applies several Ordinary Least Squared (OLS) regressions to test the relationship between trade and risk, risk and enterprises, and the effect of numerous variables upon risk and the number of enterprises, such that trade risk should be lessened by diversifying into more enterprises and greater industries. Regression is a technique “used to estimate the slope and intercept... in the population” (Wooldridge, 2009). In the end, this article is historical, and somewhat deductive, using statistics to identify what factors, such as risk, contribute to diversification, and also when diversification occurs. Hence, it uses “mixed methods,” or triangulation, to capture both the causal reasons for diversification and its occurrence. This work offers a more in-depth view of trade in all of its forms, and its risks, than prior research.

3. Results

3.1. Results from methodology I: The turning-point in history

Probing into how trade leads to diversification, there is no better place or time to examine trade than from its ascent, when the Industrial Revolution, European peace, and natural disasters all collided in the early 1800s, following 200 years of protectionism. The repeal of Europe’s Corn Laws was complex, involving ideas from economists, political leaders, and forces from social groups and institutions. Ireland was loosely connected with the British system of government. This mid-19th Century food crisis in Europe led to political changes, which helped spark Karl Marx’s work on the working class versus elite differences, central to his economic theories, known as Marxism. Writes Vanhaute *et al.*, (2006), the blight “gradually... affected the whole world.” (Vanhaute *et al.*, 2006). Other analysts, such as Chang (2013), point to the 1860s as the key time period for free trade, although the reasons why are not clear; perhaps, though, it was due to the advent of railroads (Chang, 2013). Also, they may be referring to the famines in colonial India in the mid-19th Century, noted by Burgess & Donaldson (2010), and of which Ravallion (1987) asserts, “[free] trade did have a stabilizing influence” (Ravallion, 1987). While the Industrial Revolution was the spark of trade, diversification was the theory.

According to statistics by Vanhaute *et al.* (2006), Europe at this “revolution” saw the start of trade. Governments based their policies on how bad the blights were, and the ideological orientation of the country (Bloy, 2002). The United Kingdom opened trade to reform rural society and nourish its people; Denmark demurred because of help from private charities; the Netherlands had help from old institutions and elites; Spain tried to stimulate exports; and Belgium was historically averse to trade.

Journal of Economics Library

France would reduce tariffs to lessen costs from transporting goods from Russia (Vanhaute *et al.*, 2006).

British Prime Minister Sir Robert Peel (in office 1834-35 and 1841-46) was an unusual member of the conservative Tory party, favoring free trade through-out his political career, despite collegial opposition. Most of the British Parliament was in favor of high barriers to protect domestic farming. Ireland, which was its own quasi-state at the time, was the state most affected by the blights which permeated all of northern Europe. The blight was seen by Parliament as a temporary problem solvable by purchasing cheap, "Indian corn" from America to ship it to Ireland humanely (Kinealy, 1998).

To take a step back, the "Corn Laws" actually referred to all agricultural and grain tariffs, most namely, that on bread. The laws supposedly dated in some form to around 1360, according to one clergy member (Storrs, 1816 App. 1). The end of the Napoleonic Wars, lasting the mid-1700s to the mid-1800s, removed the physical naval blockages between England and France, and there was hope for an improved economy. But, bad crops and poor weather struck Europe, causing periods of stagnation, as did the ending of the "war economy," in England, France and Germany (Buer, 1921). Scholars have argued that tariffs can cause trade fluctuations, and thus growth volatility. But, the fluctuations of the 1820s and 1830s were manufacturing oriented (Buer, 1921), since agriculture was a small part of total trade (Schonhardt-Bailey, 2006). New supply chains were emerging, but some writers at the time questioned the "bounty" that was paid to the sailing industry to ship grains abroad rather than have it imported, supporting the concept of freer trade (Birt, 1753).

The ideas at the time for the passage and repeal came not only from David Ricardo, but also from T.R. Malthus, in his primary source book, *Observations on the Effects of the Corn Laws* (1814). Malthus was more familiar with the great economist Adam Smith than Ricardo, and pointed out, even before Ricardo, that the benefit of free trade was to meet different demand and supply quantities in various places in Europe (Malthus, 1814). He looked not towards Ireland, but longer-term, writing that importation could "support a part of our present population, ... in... the next twenty to twenty-five years" (Malthus, 1814). Without this, "an unfavorable season, ...an evil of the of the slightest consequence, ... is not more likely to happen, if our average imports were two million quarters," (Malthus, 1814).

Instead, "free trade in corn would... secure a cheaper, but a more steady, supply of grain" (Malthus, 1814). Malthus warned that "if (a country) become dependent for the support... upon corn, (it) exposes itself to the risk of having its most essential supplies suddenly fail at the time of its greatest need." He continues, "It would be as much again... those nations which raised the superabundant supply as against the one which wanted it..." (Malthus, 1814). Malthus warns that one shock to trade could be "a widely extended war," noting that during the Napoleonic Wars, wages were "subject to great fluctuations" (Malthus, 1814). He ends by

T.J. Barry, 7(4), 2020, p.141-175.

Journal of Economics Library

supporting tariffs, mostly for their revenue, but not during “extreme cases” such as following shocks (Malthus, 1814).

Not only was Malthus the only economist writing on the subject at the time, but so was David Ricardo. The two engaged in a lively debate through letters conveniently referred to as *Grounds* and *Essays*, respectively, which were submitted to members of Parliament (Young, 1800). In these letters, Malthus actually vacillated and had doubts about repeal, particularly because of national security interests, fearing that foreign dependency on corn could be jeopardized by a war. Ricardo in part agreed, saying that “Bonaparte” was wise to limit corn trade with its rival Russia, but overall thought free trade would lessen risk, what he called “dangers,” and open new markets, thus making greater use of available land, a theme in his writings (Salvadori & Signorino, 2015). Like Malthus, Ricardo foreshadowed game theory, a basic model which your author later shows (Salvadori & Signorino, 2015). It is very interesting that the debate over the Corn Laws are believed to have actually inspired Ricardo on his creation of the comparative advantage theory, with an exact time frame in 1816, at the start of the debate, nailed down (Salvadori & Signorino, 2015).

Grey writes, however, that the writings of Malthus and Ricardo were not forefront in the argument, except among the landlord class (Grey, 1999). Instead, the government relied on a “younger generation of economists,” who were more optimistic about Ireland sustaining itself (Grey, 1999). These were “Christian economists” from Protestant British schools, who believed in removing “restrictions on economic life so as to reveal... the natural moral law...” (Grey, 1999). Even so, Grey writes, “It is difficult to identify [even] the direct effect of Christian economics,” such they were often overshadowed by the followers of Jeremy Bentham and John Stuart Mill who believed in utilitarianism to help society (Grey, 1999).

An extreme case that Ricardo and Malthus foresaw took place with Ireland. The Napoleonic Wars had heightened the need for the trade of grain, and the end of the war made this possible. Near the end of the wars, the 1815 version of the Corn Laws were passed, which protected Irish corn in their home market, while the invention of steam at Industrial Revolution’s onset provided easier export. By 1830, Ireland was feeding its people on cheap potatoes, not a native crop, and sending Britain 80% of its corn, presumably for profit and because it was not part of the Irish diet (Kinealy, 1998). The Navigation Acts, which stymied free movement of goods, were also a barrier to trade (Kinealy, 1998). The British policy was aimed at the hope that “Indian corn” would be easier to digest and become a staple in the Irish diet, but not necessarily Britain’s (Kinealy, 1998).

Diversification was an argument for free trade. From the mid-1820s to the mid-1840s, the United Kingdom was undergoing a process of “export-sector diversification into a broader range of export trades... spread more evenly throughout the country” (Schonhardt-Bailey, 2006). The wealthy who were unable to diversify out of agriculture supported protectionism to help their own farm businesses (Schonhardt-Bailey, 2006). Parliament

T.J. Barry, 7(4), 2020, p.141-175.

Journal of Economics Library

members from areas that were more diversified in agriculture, and invested in industry, favored free trade, showing the importance of the early Industrial Revolution. Industrialists wanted open markets to feed their labor, farmers wanted protection, given that foreign markets like Ireland were not yet formed, while the overall public wanted free trade for lower prices (Schonhardt-Bailey, 2006). Overall, political leaders involved in diverse industries used restructuring of Ireland in order to please everyone. Prime Minister Peel's policies were therefore based on "pragmatism," which "allowed the resultant political discourse to be expressed in humanitarian rather than pragmatic terms" (Kinealy, 1998). Thus, England's trade policies "had more to do with... agriculture and social restructuring, than with... food shortages" (Kinealy 1998).

Of all of the historical documents debating the issue, the overwhelmingly majority supported repeal, and free trade. This consisted of, too, the farmers, some who were looking out for the "overall good," known in economics as "utility," that was theorized contemporaneously by British economist John Stuart Mill. Even the middle-men, middle class merchants favored repeal, some writing that farmers should be allowed to take their own "risks" irrelevant of government (Westlake, 1833). Others favored "competition" (Lawn, 1801), and some, the good of the overall "community" (Storrs, 1816), "the common good," the "happinefs (sic) of the whole country" (Debrett 1800), and the "happinefs (sic) of the pooreft (sic) claffes (sic) (of the community)" (Debrett, 1800). Still, others blamed price fluctuations on "commercial (speculators)" (Young, 1800; Lawn, 1801, pp.vi), as do many today over oil speculation. One writer praised the storage granaries of Holland as a good policy (Rayment, 1790).

The impact of the "loss of supply [to England] was an important consideration... on the removal of protective legislation" (Kinealy, 1998). Humanity was the purpose, but the arguments about the risks of relying on singular crops were present, as were the motivations of the British MP's. The Corn Law tariffs were repealed, in stages. France, in 1859, did indeed reciprocate (Owen, 2005), as did many other nations in Europe who were experiencing a manufacturing class than needed sustenance (Schonhardt-Bailey, 2006). In the aftermath, the repeal resulted in a restructuring of the Irish economy, a move away from grain to livestock like poultry. Many workers moved into manufacturing (Kinealy, 1998). According to Sir Charles Trevelyan, Permanent Secretary at the Treasury and in-charge of relief efforts, the intention was to bring about "the change from an idle, barbarous, isolated potato cultivation, to corn cultivation, which enforces industry, and together employer and employed in [mutual] beneficial relations" (Kinealy, 1998). Long-term, the United Kingdom gained, chiefly Ireland, supply chains cemented, and Europe, despite a few surplus harvests in the 1880s that renewed debate, pursued free trade until a pause in World War I, but resuming afterwards (Owen, 2005).

Journal of Economics Library

3.2. Results from methodology II: A simple game theory model

The game theory model that follows, a method of outcomes developed by John Nash, John von Neumann, and many other experimental economists from the 1950s onward suggest that parties in competition can either use a dominant strategy, or a socially optimum strategy, in the last case reaching an equilibrium on how the competing party is expected to behave. This model in particular depicts how Keynesian type shocks can cause businesses in countries to come to the conclusion of diversification intuitively. This results in a socially-optimum level of trade that is right for the right size of country, based both on Ricardian economics, and diversification. Whichever ones comes first, the shock or intuition, is most likely dependent on domestic and international institutions.

	Large GDP country (amount of production, some which is used for trade)	
	Small	Large
Small Country (below) Small (amount of production, some used to diversify)	under-production (too risky)	doesn't conform to Ricardian economics
	* just right for the large country	Overproduction (excess inventory)

Figure 1. *Game Theory of Production*

*The small country exports its surpluses which lessen the risks of the large, specialized country. This assumes the small country has the comparative advantages. If it did not, and the large country did, then the square which reads, “does not conform” would be the ideal equilibrium. If the countries were equal size, then a 3-dimensional framework would show that they each would trade a medium amount. The “large” and “small” amounts are in proportion to a country’s size, which affects buying power, but this is not essential in dealing with comparative advantage, although Krugman (1981) points out that large international firms can reduce costs and reach “economies of scale.”

3.3. Results from Methodology III: Modern cases of diversification in trade

So far, this article has mainly shown how intuition leads to diversification; business-people may notice a lacking area. But, are countries in the 21st Century diversifying, and why, such as from shocks, which, unlike financial crises, must call on longer-run domestic institutions for restructuring? This section demonstrates, as with the start of free trade in the 1800s, that capital, cyclical, or agriculture sometimes convince countries to stress diversification, using a qualitative mix of government and business documents. The article thus turns to three modern OECD countries not analyzed statistically, and which relied little on institutions like the World Trade Organization (WTO) for aid: Japan, Finland, and

Journal of Economics Library

Australia, to study capital (energy), cyclical (industry), and agriculture, which are all variables used later in the regressions.

3.3.1. Example 1: Japan- The risk of trading capital

Since even before World War II, Japan has been concerned with diversification of trade, particular regarding energy issues. In 2010, Japan was hit by an earthquake, and subsequent tsunami, that damaged capital of three reactors at its Daiichi Nuclear Power Plant, dismantling one-third of its energy output (Calabrese, 2012). Gross Domestic Product (GDP) for the nation dropped 2.3% initially, which was later revised to -0.7%. It was helped by roughly \$4.5 billion in international aid, but also by restructuring (Jiji Press, 2012). Japan's nuclear capital was a comparative advantage, since the United States allowed it to use civilian nuclear energy (Social "New Voices", 2016). The start of World War II arose in part from Japan's energy needs in its influence sphere (World Nuclear "Nuclear", 2016).

Following the disaster, Japan's energy consumption fell 4.2% from 2010-2012, with a larger fall of 8.0% in electric consumption. This cost fell on families to save energy, so the state formed a Central Peak Pricing Plan (CPP), which altered prices based on the time of day (Meti "Strategic" 2014b). Even food was affected, since electricity affects food grown in cool greenhouses. Those who recalled World War II suggested "spreading their investment tentacles overseas" (Barrett & Notaras 2012), to "be more food-secure..." (Barrett & Notaras, 2012). The issue is one of "diversifying" food logistics, since Japan relies on many comparatively advantaged crops (Barrett & Notaras, 2012).

The overall situation was described by a 2014 government report as having "a lack of flexibility in the supply structure" (Meti "Strategic" 2014b). To resolve stuck supply chains, the same government document suggested, "building a ... 'diversified flexible energy supply-demand structure' ..." (Meti "Strategic" 2014b). Furthermore, these goals could be accomplished by diversifying its supply chain from its tightknit keiretsu (Meti "Strategic" 2014b). Yet, asserts United States Professor John Calabrese, the Fukushima incident has caused a "(r)e-evaluation of domestic energy policy [for] diversification" (World Nuclear "Nuclear", 2016). A few years on, the amount of new enterprises, and diversification, due to the shock, have increased (Meti "2014 White" 2014a).

3.3.2. Example 2: Finland- The risk of cyclically traded goods

Finland is a fairly small country that has experienced numerous cyclical shocks since World War II, and is an example of attempts at diversification. These attempts have failed due to poor government policy and rigid institutional structures, which include strong labor and capital rules and the need for specialized goods due to finicky, proximate trading partners, in Russia, once the Soviet Union. Finland's exports shifting after its World War II depression from lumber and munitions to specialized goods, such as paper and packing materials, and most recently, with some diversification, electronics (Translators "Finland Foreign" 2016). Finland has the "Nordic model" of the state working with businesses, but its businessmen and

T.J. Barry, 7(4), 2020, p.141-175.

Journal of Economics Library

bankers are more powerful, stymying government policies. Having little coal or oil, which are comparatively advantaged goods, Finland has been forced to trade with Russia. Its exports have been forced to become specialized, despite attempts to diversify into: paper machines, elevators, cranes, and icebreaker vessels (Evans, 1995).

Freer financing led to household indebtedness, and contributed to the “great depression” in the 1990s (Statistics Finland, 2016). The fall of the Soviet Union, its major trading partner added to the problem, write Gulan et al. This resulted in a 12.6% decline in GDP, and unemployment rising to 17.9% (Gulan et al. 2014). When the Soviet Union fell, “a considerable part of the sectors exporting... became obsolete after 1991” (Gulan et al. 2014, 25).

Today, Finland continues to struggle, and will “need to address the lack of diversification in its export sector...” (Eurozone, 2015). Concentration can be seen in that the top-10 Finnish firms produce a third of the state’s exports. Nokia, the cell-phone maker, yielded ¼ of Finnish growth from 1998-2007 (The Economist “The Nokia”, 2012). Said one writer, “diversification is key in industrial [technology] policy,” and another, “[e]xploring the dependency on particular industrial clusters [can measure] where diversification is most lacking” (The Economist “The Nokia”, 2012).

Lack of diversification will require another round of government restructuring, involving “government investments or encourage[ing] [the] private sector to participate in RE (renewable energy) programs...” (Aslani et al. 2014, 761). Furthermore, efforts such “Team Finland,” for firms to promote exports jointly, and union labor reforms, will help diversify, such as to in biotech, clean energy, and digitization, says a European report (European Commission “Country” 2016). Special interest groups have resisted “institutional adjustments” (Gorodnichenko et al. 2009). High taxation, an aging society, and openness of the economy all acerbate risk (Hjerpe, 2008). If another round of changes are not made, writes one author “[f]ailure to do so could cause permanent damage to Finland’s potential output growth” (Eurozone, 2015).

3.3.3. Example 3: Australia- The risks of trading agriculture

Australia’s economy has seen many diversifying challenges- “different industries have risen and fallen” (Aus. Bur. “Research”, 2014). Manufacturing has at times been strong: the country saw a mining boom in the 1980s and ’90s (Aus. Bur. “Research”, 2014). Agriculture, which, due to its proximity to Asian markets, is comparatively advantaged, has been affected by droughts, in nearly every decade, and in the early 2000s, the most severe (Aus. Bur. “Research”, 2012). In the last drought, the federal state gave \$4.5 billion in aid; the International Monetary Fund (IMF) aided with forecasts (Kennedy, 2012). Beginning in 1992, the state established an official policy to aid farmers under risk, which includes research into new crops, interest rate subsidies, and advice and training. The larger farms diversify away from cereals, which constitute 70% of overall production (Chavas, 2008). The 2013 review of the Regional Development

T.J. Barry, 7(4), 2020, p.141-175.

Journal of Economics Library

Committeefound that a major economic threat was “reliance on one or a few ... industries,” and needed to “diversify” (*Aus. Bur. “Research”, 2014*). However, specialization in regional clusters has allowed firms to develop intricate supply chains to lessen risks, and a few regions are diversifying (*Aus. Bur. “Research”, 2014*).

The last drought of the early 2000s, which was really two separate droughts, was likely caused by El Nino, the Pacific Ocean’s Gulf Stream (*Barry, 2008*). Australia’s rice crop fell by 98%. Since Australian rice makes up 15% of the world total (*Barry, 2008*), 20 million people around the world were affected. There were later global riots. Many farmers have diversified into sheepherding, wine making, or wheat, which use less water, or “lucrative crops” (*Bradsher, 2008*). These crops include rice that blooms earlier seasonally. That rice is comparatively advantaged, and a staple in foreign markets, makes diversifying harder (*Bradsher, 2008*).

One writer observes that Australia’s export concentration, compared to consumption, is one of the highest in the world (*Thirlwell, 2015*). Some 32.5% of Australian trade goes to China. He writes, “[p]olicymakers need to reconsider industrial policies” of making the entire society and country more “diverse” (*Conley, 2014*). One Californian lawmaker believes that other countries can learn from Australia’s efforts to diversify its water supply across regions (*Olsen, 2015*). The World Bank has called for Australia to change policies in favor of greater diversification (*Reilly, 2002*).

3.4. Result from methodology IV: International trade organizations

Following free trade, in the period between World War I and World War II, much of disaster aid was provided philanthropically. The United Kingdom and the United States switched on and off the “gold standard,” increasing currency risks. But, the development of the international risk-abating system at Bretton Woods, led by John Maynard Keynes, President Truman’s Point 4 plan, the Marshall Plan, and the formation of supply chains by businesses, helped to reduced risk. In his 1949 inauguration address, United States President Harry S. Truman outlined four step plan for fighting communism. The last plan was known as “Point IV,” its purpose to help the “underdeveloped areas” of the world, particularly in Latin American and Southeast Asia. It was the first time that this term had ever been used or addressed. The combination of all of these plans led to the “most rapid rates of economic growth and most enduring stability in modern history” (*Frieden, 2006*). From 1948-1958, the world economy grew 5.1% per year, and 6.6% per year until 1970 (*Osterhammel & Petersson, 2006*). American businessman Edward Deming would travel to Japan in the 1950s and ‘60s to discuss efficient ways of organizing companies for trade, which became known as “supply chains.”

Governments that engage in trade or international finance subject themselves to various risks. One way to avoid them is to rely on international institutions. Trade and finance volatility since World War II have been assuaged by institutional organizations on the world stage

T.J. Barry, 7(4), 2020, p.141-175.

Journal of Economics Library

(observe the chart that follows). We observe four states, Mexico, South Korea, Argentina, and Greece and how they were rescued by global institutions. The first crisis was Mexico's 1994-1995 "Tequila Crisis," after deregulation opened up to financial inflows. Mexico engaged in privatization of banks, and many began making risky loans. Mexico was able to acquire \$20 billion dollars in loans from the United States, but the key to stability was a \$30 billion dollar loan from the International Monetary Fund (IMF). Before the Coronavirus, Mexico's growth had recovered to over 3% (Mishkin, 2006).

South Korea faced a crisis in the late 1990s, largely because of their domestic institutions called chaebols, which are family run supply chains. The chaebols started to take undiversified, excessive risks, with debtors knowing that they would be repaid by the government in the case of speculative behavior: moral hazard (Mishkin, 2006). Chaebols, needing money for speculative loans, turned to unregulated merchant banks, which are unique to South Korea. A number of shocks then occurred, including a depreciation of the Japanese yen, and a speculative run in Thailand, which made South Korea's exports more difficult to compete, so it had to devalue its currency by over 20%, and many of the banks were forced out of business (Mishkin, 2006). South Korea's international crisis was short, due to \$60 billion in aid from the IMF. Political change diversified power, giving the central bank new liberties, and 617 financial institutions were closed or restructured (Mishkin, 2006).

The Argentinian crisis of 2001-2002 resulted from domestic, structural problems, as well as their Convertibility Law. This law pegged the pesos to the dollar. Still, Argentina had nearly the "most innovative" regulatory systems in the world. At the start, banks and bond traders did not realize that they could be susceptible to currency risks, and over lent. Then, the government faced massive debts from excessive spending. When the U.S. dollar strengthened, so did the pesos, which hurt exports, and then, the state changed the Convertibility Law- without preparation, there was inflation, and everyone sold the pesos because it was worth so little. Argentina was only able to recover through help from the IMF, and increased agricultural exports (Mishkin, 2006). Finally, with Greece, this crisis, which began in 2009 when the state's debt reached 170% of its GDP, signified flaws in the European joint trading and currency zone, which enabled fiscal, but not monetary, policy (Nelson *et al.*, 2015).

The following descriptive statistics chart, with data from the St. Louis Federal Reserve, shows volatility before IMF help and volatility after IMF help. Volatility was measured as: Average of [(absolute value of) GDP-5yr./4yr. Average GDP]/ Average GDP over the time length (calculated from St. Louis Federal Reserve data and the World Bank). Five years before and after, and four years for during the crisis, were chosen since GDP fluctuates in approximately 5-10 year cycles. These countries were chosen because they represented the greatest financial and international crises

Journal of Economics Library

since World War II, more-so than in the previous section, and perhaps even since the Corn Laws.

Table 1. *Stabilizing Impact of the IMF and Other Loans: The IMF is stabilizing.*

	Volatility (5 Years before and after, and within 4 years of the crisis)			Time and Amount of IMF Aid
	5 yrs. Before	During 4 yrs.	5 yrs. After	
Mexico (94-95) Ave. Growth	3.46	2.23	3.82	
Volatility	0.207	0.164	0.253	In February, 1995, the IMF loaned \$30 billion dollars, with \$20 billion coming from the United States.
S. Korea (97-98) Ave. Growth	7.9	4.5	4.7	
Volatility	0.170	0.191	0.118	In December 1997, the IMF loaned \$60 billion, some of which was from the World Bank and foreign countries, and foreign countries allowed refinancing of \$25 billion in short-term notes.
Argentina (01-02) Ave. Growth	2.38	-1.83	7.82	
Volatility	0.046	0.421	0.243	In 2000, Argentina obtained \$13.7 billion from the IMF, and \$26 billion from other sources, plus \$4.5 billion from overdue creditors, and \$8 billion more from foreign states in 2001.
United States (07-08) Ave. Growth	2.54	0.35	2.0	
Volatility	0.359	2.603	0.192	In October 2008, Congress passed an emergency bill of a \$700 billion loan to buy Wall Street equity, and in Feb. 2009, an \$831 billion stimulus bill.
Greece (2008-2009) Ave. Growth	0.04	-0.02	-0.04	
Volatility	0.373	1.882	0.917	In May 2010, the IMF offered \$110 billion euros, or roughly \$83 billion, which was followed later by more loans and restructuring.

While such institutions were not available during the time of the Corn Laws, this chart shows the impact of post-World War II institutions on enormous instances of trade risk crises. Argentina's low volatility before its crisis is surprising, but it experienced several, stagnating recessions which paralyzed growth at a low, steady level. Mexico showed very little volatility during its crisis, because it was short-lived, meaning that recovery balanced out the economic dips. Mexico also receive a plentiful \$30 billion dollars in total aid, with \$20 billion from America, because the United States valued it as an important trading partner. The Greek crisis remained volatile afterwards because it was not fully resolved, and new liberal parties came to power. One can see that growth can be stabilizing or destabilizing, and vice-versa.

Journal of Economics Library

3.5. Results from methodology V: The tests using statistics

This section contains a multiple regression trying to explain what variables affect diversification, of nine randomly selected OECD (Organization for Economic Cooperation and Development) countries; the countries were the Czech Republic (Czechia), Estonia, France, Italy, Portugal, Poland, Slovakia, Slovenia, and the United Kingdom. The years are 1996-2007, which were chosen for three reasons: the availability of data, the fact that trade rounds usually last about a dozen years, and to recognize the trade loss, from funding decline, after the 2008 global crisis.

The variables include energy, manufacturing, and agriculture, just analyzed among the cases. It correlates: a country's number of enterprises (y) (B^*) with its GDP ($B1$), an index of riskiness or cyclical of *manufacturing* ($B2$), economic ($B3$) and political freedom (as more free societies should have entrepreneurs able to be "pulled" into other industries) ($B4$), insurance development (which reduces risk) ($B5$), vertical trade/intermediate goods (which should increase risk) ($B6$), trade as a whole (which we see here should increase risk and lead to more industries so that states have less risk from shocks) ($B7$), trade openness (increases risk) ($B8$) and intra-industry trade (should reduce industries and risk) ($B9$), oil resources ($B10$), agriculture ($B11$), level of technology ($B12$), a Gini coefficient of income inequality ($B13$), and entrepreneurship ($B14$).

The hypothesis is that trade, and other factors, increase riskiness, which leads to greater diversification into more enterprises, and that other variables help mitigate for risk. The last several variables should be riskier industries and lead to a greater industry diversification, as well as the Gini coefficient, which indicates less spread out wealth and thus more riskiness. The countries were chosen using a randomized list, with several countries being subsequently being eliminated due to lack of data. To this author's understanding, no such other exact regressions have been run.

The data was obtained from:

Risk: OECD Risk Classification

Be: OECD Enterprises

B1: World Bank-per capita

B2: World Bank index

B3: Composite Index, CESifo Dice Database Comparisons in Europe

B4: Worldwide Governance Indicators, Voice and Accountability

B5: Insurance and fin. Services, % of service exports, World Bank

B6: Intermediate goods: Calculated from OECD

B7: OECD Total Trade in Goods and Services

B8: Tariff rate, weighted mean for all products/ Imports (from World Bank)

B9: Grubel and Lloyd Index on Intra-European Trade from (Yoo-Duk Kang).

B10: Absolute value of energy imports, % of energy use, World Bank

B11: Agricultural Investment, FAO

B12: GERD from World Bank

B13: Inequality Spreadsheet from United Nations University

B14: OECD total patents per year

Journal of Economics Library

Foundational work: these four regressions were run to test the basic hypothesis, and the causal direction of the most important variable, trade, for the diversification theory. The first regression is to demonstrate that trade increases risk, captured through a simple equation of:

$$\text{Risk Index (Br, OECD risk)} = \text{Trade \% of GDP (Bt/gdp)}.$$

$$\text{Ho: Bt/gdp} = 0 \qquad \text{Ha: Bt/gdp} > 0$$

Table 2. *Trade and Risk: Trade can increase risks.*

Dependent Variable: Risk	Number of Obs. = 81	F > p = 0.000*	R2= 0.4407
	Coefficient	t	p
Trade percent	0.0245	7.89	0.000*
Constant	-0.5022	-2.12	0.037*

Note: *= Significant at 95%

The second equation demonstrates that enterprises diversify and reduce risk.

$$\text{Risk} = \text{Enterprises (Be)}$$

$$\text{Ho: Be} = 0 \qquad \text{Ha: Be} < 0$$

Table 3. *Enterprises and Risk: More enterprises can reduce risk.*

F > p= 0.000*	No. of Obs: 81	R2= 0.319	Dependent Var: Risk
	Coefficient	t	p
Enterprises	-7.02e-07	-6.08	0.000*
constant	1.8276	11.91	0.000*

Note: *Significant at 95%

The third preliminary equation demonstrates that diversification affects GDP volatility.

$$\text{Volatility} = \text{Enterprises}$$

$$\text{Ho: Be} = 0 \qquad \text{Ha: Be} < 0$$

Table 4. *Enterprises and Volatility: More enterprises can reduce volatility.*

Volatility [abs (ave.-growth)/average]	F > p: 0.0003*	No. of Obs: 108	R2: 0.1149
	Coefficient	t	p
Enterprises	-4.48e-07	-3.71	0.000*
constant	1.7958	10.33	0.000*

Note: *Significant at 95%

A fourth regression was run using volatility as the dependent variable, but whereas this was calculated as the absolute value of GDP difference from the country's average over the period. The results using this measure of volatility were significant.

$$\text{Ho: Bt} = 0$$

$$\text{Ha: Bt} > 0$$

Table 5. Trade and Volatility: Trade can increase volatility.

No. of Obs.: 108,	F > p = 0.0000*	R2 = 0.1909	
GDP_Volati~y	Coefficient	t	p
Trade	0.0173	5.00	0.000*
Constant	0.0952	0.34	0.733

Note: *Significant at 95%

In all of these preliminary equations, the hypotheses were met. There was little skewness or kurtosis with the number of firms per country, so it was close to normal, a bell curve. For the preliminary regressions, the first used trade as a percentage of GDP, while for the preeminent regression, total trade was used. Trade as a whole may be very low for small, high risk countries. Additionally, as GDP rises, supply chains solidify, and as the GDP figure in the denominator rises, GDP reduces risk and volatility. However, GDP increases the number of enterprises, so if trade/GDP were used for the preeminent equation, a growing denominator would render it as yielding fewer industries; likewise, there would be a serial correlation between the trade/GDP and GDP variables.

Preeminent statistical work: *Enterprises*:

The null and alternative hypotheses are as follows, with all of the fifteen variables listed in the previous methodology section:

Ho: B1 to B14 = 0

Ha: B1, B2, B6 to B13 (minus B8 to B9) > 0

Ha additional: B3 to B5, B8, B9 < 0

y = Bo (constant) + B1 + B2 + B3 ... + B14

For the preeminent regression, your author regressed the number of enterprises in a country by GDP per population, and GDP per population squared, hoping to discover a U shaped relationship that would be indicated by a positive GDP and negative GDP squared, that would show stages of diversification. A test revealed absolutely no skewness or kurtosis, at 99% and 90% significance, respectively, and a normal distribution.

Even though GDP turned out positive in the final regression, and turned out to be highly significant, adding GDP² was also significant, and increased the R2 value of the model, which will be explained. The GDP² term indicates that there is an inverted U shape curve to diversification, or, as other authors that have found this relationship describe it, a U shape curve of "specialization." In other words, as countries start to grow, they diversify until they reach a point, estimated here through calculus to be $[B1/2B2 = 91.2691 / (0.0010148 \times 2)] =$ per capita GDP \$44,969.01, or, similarly, \$507.13 billion in trade. After this point, large nations are able to specialize even more, as with the United States and computers and finance. Other iterations were lower. Large states do not "become set in their ways" institutionally, but take on greater risks because they can absorb the risk, which is consistent with other studies. The constant term may indicate that number of enterprises is fairly standard, due to globalization that has

Journal of Economics Library

affected all countries, but the amount of dedication to each single industry may vary.

Table 6. *Trade, Risk, and Other Variables: This regression shows much significance.*

Dependent variable: #of enterprises F= 67.37 P > F = 0.0000* R2 = 0.9103 Obs.= 108

Independent variable	coefficient	t-score	P value	beta
GDP_per_capita	91.2691	4.98	0.000*	0.935
GDP_per_capita2	-0.0010148	-2.53	0.013*	-0.447
Manufacturing Inv.	-8302.36	-0.83	0.411	-0.060
Economic Freedom	-110.0545	-0.01	0.992	-0.001
Democracy	-30102.61	-2.73	0.008*	-0.208
Insurance	-23409	-2.81	0.006*	-0.180
Intermediate Goods	20523.6	1.26	0.212	0.106
Trade	3.665781	6.10	0.000*	0.831
Trade_Openness	-19491.76	-2.97	0.004*	-0.129
Intra-Industry Trade	-2882821	-2.92	0.004*	-0.304
Energy	-366.106	-2.87	0.005*	-0.232
Agriculture Inv.	67.54223	8.13	0.000*	0.444
Technology	-256979.1	-1.25	0.215**	-0.123
Gini Coefficient	542992.58	3.50	0.001*	0.228
Constant	3149305	2.29	0.024*	N/A
Entrepreneurship	Left out for	serial	correlation	N/A

Note: *= significant at the 95% level.

A Breusch-Pagan test was run for to observe heteroscedasticity, the divergence of data from the line of best fit for very large or small numbers; there appears to be little. The $\chi^2(14)$ was 65.44, and $\text{Prob} > \chi^2 = 0.0000$.

For the other variables, all early iterations confirmed the majority of hypotheses, but a re-chosen measure for agricultural and industrial production needed to be employed because the early indexes showed relationships from year to year and not between the countries themselves. Much of the work involved rounding as Stata would not take a combination of decimal and whole numbers; it also was not helpful that the World Bank changed their websites during the research. Although over 1,500 pieces of data were entered into Stata, the lack of less than 1% of data called for counterfactuals to be created in these cases, either taking the value of the previous or following year, or an average. A degree of serial correlation may be present since a number of variables are similar and involve GDP or population, which could not be avoided, other than by searching for varied indexes and attempting several iterations of running the data.

Regarding the final model, the high F value indicates very strong significance, and the R2 of 0.9103 indicates the incredible amount of predictability of the model (91.03%), while the adjusted R2 of 0.8967 suggests that the sample size was not too small, since size reduces standard error. Democracy, for which a “voice and accountability” measure was used, caused a reduction in the number of firms, but economic freedom most likely did not affect the number of industries because many of the former Soviet States still have “push models” for their labor markets, and

Journal of Economics Library

as young people are turning away from profit incentives. Economic freedom, while giving freedom to start industries, may eliminate the impetus to. An entrepreneurial variable, for patents, was sought to correct for this dilemma, but was serially correlated and affected the others variables, and another proxy dating to 1996 was unavailable. Using beta to compare the different coefficients, GDP and trade U curves do the most to diversify.

Intra-industry trade in essence did result as expected since intra-industry trade reduces regular trade, which is risky, thereby indirectly reducing risk, and is an important finding. Trade barriers were interesting in that they indicated that more firms are created, most likely because they protect infant industries. Since most trade openness variables use trade itself, this could lead to correlation, so instead an index was used. The index may have been correlated, too, because, ironically, most of the states in the OECD have similar average tariff levels. Manufacturing did not turn out as significant, most likely because the states in the OECD are witnessing a decline of this sector, and are not forming new firms, and perhaps also because data on these sectors are difficult to measure, despite the fact that several different indexes were used. Agriculture was positive, indicating riskiness. Investment in agriculture was used, rather than crops or land acreage, in chemicals, fertilizers, and machinery. Intermediate goods trade was surprisingly one variable that was not significant in either direction, meaning that they conform to what one might call "Ricardian efficiency," which shall be discussed in the conclusion part of this article. Furthermore, energy reduces enterprises, probably because energy results in large oligopolies, and finally, in one regression (see results), technology was ambiguous, because while technology can lead to more firms, it can result in barriers to entry, such as patents, which prevent new firms from entering the market.

To address other caveats, GDP and trade should not be serially correlated since GDP is Ex-Im, not Ex+Im, but manufacturing may be correlated with GDP. Two different iterations were attempted, which used overall manufacturing-value-added rather than an index, and manufacturing productivity, but both were strongly correlated with trade and GDP. While manufacturing's share of the economy in all these OECD states is declining, manufacturing in certain iterations was volatile, more so than services, contrasting with several previous studies. The trade openness index should not conflict with exports as a whole. But, an index often does not consider the size of the country.

When one changes technology to share of exports data from the OECD, rather than the GERD Index, it becomes significant, negatively, while making manufacturing even more insignificant, since the two appear to be in competition, and eliminating the constant variable. The entire model becomes higher in R2 by 0.003, but the heteroscedasticity value decreases. If one uses technology as an index, from the GERD, it is insignificant, so the author erred on this side of caution. The income at which specialization

T.J. Barry, 7(4), 2020, p.141-175.

begins to occur changes slightly. Due to the possibility of serial correlation, the index number was used. The determination of how technology affects risk then is whether it is used domestically, when it does not affect risk, or whether it is used in trade, in which case it can, and lowers risk, most likely by helping firms reach economies of scale to become oligopolistic, serving as a form of intra-industry trade. New technology firms can also displace older one, Schumpeter's "creative destruction."

One can reason, however: the amount of risk diversification conceptually must equal the opportunity cost loss of productivity to a country, which can be accounted for by changes in the terms of trade relationships between countries, i.e: Equilibrium at:

$$\sum (\text{probability of loss} \times \text{extent of GDP loss}) = \sum (\Delta \text{terms of trade of country A} / \Delta \text{terms of trade of B})$$

The risks of trade would be $\Delta \text{ trade} / \Delta \text{ consumption}$, since as the consumption sector grows, as with import substitution industrialization in Latin America in the 1960s, trade risks decline. But, this would put pressure on interest rates, not discussed here. Therefore, the fitting equation would be $\Delta \text{undiversified trade} / \Delta \text{total trade}$.

4. Discussion

4.1. Modern day trade developments (Vertical specialization)

From the statistics, one can see that trade is risky, but that intermediate goods have neither a positive nor negative impact upon the risk of a trading country. In this sense, it can be seen as neutral, and therefore a way of taking advantage of comparative advantages, mainly in industry. In comparison, a few studies have found similar results in terms of intermediate goods. With United States firms, as of 1998, there were 39,000 parent firms and 279,000 foreign affiliates globally engaged in vertical integration trade, or intermediate goods, with huge foreign investment of \$2.7 trillion (World "New Report" 2017d).

Vertical, or intermediate trade, as opposed to intra-industry trade, is usually the trade of just parts (Hummels *et al.*, 1998). Vertical specialization also differs from outsourcing, which is the relocation of one stage of production to make a final good solely in one country. Horizontal specialization refers to goods made solely within one country (Hummels *et al.*, 1998). Hummels *et al.* (1998) find vertical specialization increased globally by 20% from 1960-1970 (Hummels *et al.*, 1998). According to Clark, it has increased globally by 30% between 1970 and 1990 (Clark, 2010). By 1990, 14.5% of all trade amongst OECD countries was vertical (Hummels *et al.*, 1998). Out of all trade, as of 1998, it may be 20-25% (Hummels *et al.*, 1998), due to trade in Asia, most likely.

A good example to look at of less risky, intermediate or vertical trade is North America. The relationship between the United States and Canada

Journal of Economics Library

extends to 1965 when both signed the US-Canada Auto Agreement. Instrumental was United States President Lyndon B. Johnson, before whom car trade was minimal. Canada had a 17.5% tariff on U.S. car imports, and the U.S. had 6.5-8.5% on Canada's. The 1965 accord brought tariffs down to zero; Canadian car exports and imports rose nearly tenfold, depending on brands (Hummels *et al.*, 1998). As of 2020, Canada and Mexico are the largest markets for U.S. cars (Villarreal, 2017). Vertical specialization was a hidden goal behind the developments, increasing dramatically. By the late 1990s, 60% of U.S. auto exports to Canada were in intermediate goods like engines and parts, while 75% of U.S. auto imports from Canada were in partial vehicles. Over three decades, vertical trade totals over 35% of the U.S.-Canada auto trade: \$30 billion dollars (Hummels *et al.*, 1998). By 2020, Canada is the largest United States total trade partner, followed by China and Mexico (Villarreal, 2017).

In Mexico, most maquiladora plants are in electronics, textiles, and transportation equipment (Hummels *et al.*, 1998). Mexican maquiladoras grew further in the 1980s under favorable politics, and then from NAFTA (the North American Free Trade Agreement) in the 1990s. Since the 1980s, 45% of all U.S. imports from Mexico have been from such plants. Maquiladora trade grew from 20% of the total U.S.-Mexican trade in 1979, to 25% by 1989, to 39% by 1996, or \$57 billion dollars. By 1996, vertical specialization was estimated at 50% of all U.S.-Mexican trade (Hummels *et al.*, 1998). Japan is now a fairly diversified economy, as has been shown, and by 1995, Japanese exports of parts to Asia came to almost 75% of its Asian trade. From 1988 to 1998, vertical specialization in Japan increased by four times as measured by yen and nine times via dollars (the exchange rate changed) (Hummels *et al.*, 1998). Spain's car trade is another example of vertical trade, that of Opel, the subsidiary for General Motors in Europe. It is estimated that 40% of Spain's trade is vertical (Hummels *et al.*, 1998).

Despite a slowdown in vertical trade in the early 2000s, there is more recently a resurgence, of now-called GVCs (Global Value Chains) (World "New Report" 2017d). Overall, vertical trade is less sizable than horizontal trade, but vertical trade is growing at a faster rate, due to globalization. According to Clark (2010), who referenced Hummels *et al.*, (1998), after a country opens to free trade, the main factors that lead to vertical specialization are: national resources and comparative advantaged goods (as Ricardo would have noted), workforce availability and population, the size of the foreign market, location near the foreign market, transport costs, and the trade orientation of each country (tariffs and other barriers) (Clark, 2010). Lesser factors are exchange rate stability, competition, the political situation of the primary country, and the type of labor skills and education the country has. Furthermore, a survey by the U.S. International Trade Commission finds that institutions that promote: civil liberties, freedom, and political stability, as measured by a political rights index, are important (Clark, 2010).

Journal of Economics Library

According to research by Hummels *et al.*, (1998) the world's largest economies are the ones "least likely" to be involved in vertical specialization, and instead rely on domestic diversifying, whereas this study has shown that nations specialize once they have become large. But, large countries find it easier, they write, due to economies of scale, to maintain domestic production (Hummels *et al.*, 1998). The United States, Germany, and Japan, three large states, are among the lowest in vertical trade. Clark writes that GDP, or market size, of the *foreign country* traded with, is the greatest predictor of vertical trade, and that there is a statistical link (Clark, 2010). In 2003, it was estimated that vertical trade can explain 50% of the growth of global trade since World War II (Yi, 2003). Finally, Clark (2010) offers that vertical specialization will soon move to countries with greater funds for research and development, which makes sense conceptually (Clark, 2010). Global firms have difficult choices: to locate affiliates in developed or developing nations.

4.2. Discussion: Comparing the results

The regressions and process tracing here found that trade increases risk, that countries diversify trade into more firms to reduce the risk up until a point, which altogether reduces volatility, until countries are better able to absorb risk through institutions like supply chains, and then specialize. So, Ricardo was partially correct, and financial theories are partially correct, as an overall generalization. An ill-suited fact is that diversification policy most likely results in the government choosing "winners and losers," which is frowned upon in the West, but used in the East and South.

On the national level, the closest findings to this article are several studies, and a summary of them (Strategy&, 2008), by Booz and Company, a global consulting firm, regarding a nation's economic volatility. Booz and Company created two opposite ratios: a "concentration ratio" and a "diversification quotient" (Strategy& 2008). Comparing "Group of 7" (G7) countries (which includes all of the countries involved in World War II, plus Canada, minus Russia) with Gulf Cooperation Council (GCC) states, G7 countries had a low 16% concentration level, while for the GCC, it was higher at 26%. The diversification quotient for G7 countries was 6.07, compared to a lower 3.87 for the Gulf States (Shediac *et al.*, 2008). Booz and Company also compared GCC states with other developing countries. The Gulf countries, obviously, were concentrated in oil and gas, but their other sectors also had high concentration ratios, many linked to the spillover effects of the oil sectors (Strategy& 2008). All of these states are highly volatile due to the sudden changes in oil prices, but "a strong foundation in export helps insulate against unexpected changes... and volatility" (Shediac *et al.*, 2008).

In the regression earlier, energy seemed to reduce risk and lessen the number of companies, due to its oligopolistic nature, which may be due to what is has come to be known as "Dutch Disease" or the "resource curse."

Manufacturing, or capital goods, are volatile, but not subject to risks such as natural disasters, namely to agriculture.

This previously mentioned study by Booz and Company found a statistically significant relationship between economic diversification and economic stability, as did the preliminary enterprises, risk, and volatility regressions here. High economic concentration yielded volatility and economic cycles, giving weight to this author's argument. But, the Booz study found that diversification in periods of prosperity can nevertheless result in volatility, because past economic shocks have long-term effects, since workers lack the skills to switch between sectors (Shediac *et al.*, 2008). Concentration, in the Booz study, was shown to lead to low productivity and global competitiveness. Using a ratio from Sharpe, a Nobel Prize winner for his work on risk, in GCC countries, a small 0.69% growth increased volatility 1%, while in the emerging "transition" countries, it took 2.69% growth for 1% volatility. This means that Gulf States with high concentrations are much more volatile, and have lower growth rates, compared to oil-rich but diversified states like Norway (Shediac *et al.*, 2008).

Within industries, diversification is usually greatest in services, such as tourism, finances, and real estate. Write Shediac *et al.*, (2008) "Countries with (low) labor diversification may suffer economically" (Shediac *et al.*, 2008). Due to diversification, though, growth volatility for the Gulf States have decreased, in the United Arab Emirates from 10-35%, to 5-9% (Shediac *et al.*, 2008). The Booz study astutely assigns 30% of volatility to a single variable: economic concentration. The other 70% is explained by unstable oil prices, inflation, exchange rates, investor and consumer confidence, and general shocks, although in 2020 oil states are making attempts at diversifying (Shediac *et al.*, 2008).

4.3. Discussion: Frontiers: Other political-economic factors in specializing

Businesses and final trade sectors of an economy may not be the only diversified components, but factor markets can be diversified, too. Imbs & Wacziarg (2000) countries specialize when *labor* specializes. Early on, increasing returns to scale make it easier for factors of production, such as labor, to concentrate in a few sectors (Imbs & Wacziarg, 2000). It is easier to produce domestically, rather than import goods at high costs, as Clark and Hummels et al. found: imports needs infrastructure and transportation (Imbs & Wacziarg, 2000). Imbs & Wacziarg (2000) also observe that as nations improve *technologically*, productivity rises, leading to more diversifying (Imbs & Wacziarg, 2000); in your author's study, it was insignificant.

Infrastructure improvements, on the other hand, lessen transportation costs, which can lead to greater specialization, since certain mass transport goods are easier to ship (Imbs & Wacziarg, 2000). The "crucial assumption" for the U-shape is that transport costs, spurring specialization, "initially"

T.J. Barry, 7(4), 2020, p.141-175.

fall less quickly than costs from high-tech competition and innovation (Imbs & Wacziarg, 2000). In other words, factors that encourage specialization- infrastructure investment- eventually turn less expensive than those leading to diversification, technology (Imbs & Wacziarg, 2000).

Also important, other studies find, are *supply chains*. Korgut *et al.* (2002) cite studies finding that supply chain “diversification... should reflect interindustry technological relatedness” (Korgut *et al.*, 2002). But, in the study here, technology was tough to evaluate statistically: it can be considered a form of intra-industry trade, which lowers risk, but in domestic commerce, it is insignificant. Lastly, *when countries do specialize, they do so differently*. Developed countries specialize in “sophisticated” industries such as nuclear power plants, as in Japan, with developing countries specializing in traditional spheres like agriculture, family-owned, or religious businesses (Brutti, 2010).

5. Methodological caveats/limitations

To begin with, no statistical model can completely capture all variables: for instance, currency risk was omitted from the model employed here since there is no conceivable way to conceptualize whether or not it should lead to more firms, with diversification, or fewer. Fewer firms may not only be a sign of specialization but can also be an indication of mergers and acquisitions that lessened the diversity of an economy. In the 1980s in the United States, concentration increased in the retail, electric, gas, utilities, and transportation sectors, but concentration decreased in manufacturing and life insurance (O’Neill, 1996).

A second concern is that former communist countries, such as those in Eastern Europe, may have different patterns of diversity or specialization given their historical, political-economic situations. The author did not use the United States as an example in the statistical pool because it was not randomly chosen, and nevertheless, certain data was missing. In the nascent days of the euro, there became a greater amount of European trade, around the year 2000. Next, while there was no apparent time series correlation, it was observed that there was a reverse “feedback loop,” that the number of industries seemed to positively affect the amount of trade in the next year period. Finally, data typos are an honest fact of life.

6. Conclusions and policy recommendations

This article began with the theories on trade from David Ricardo in the 1800s, who actually conceived his ideas about comparative advantage due to the risks presented by the lengthy 19th Century European wars and blights. While comparative advantage still holds, diversification was indeed a factor that ushered in free trade, confirming this hypothesis. The second methodological approach showed that countries can realize this intuitively, while the case histories of the varied economies shows that it can be inspired by an economic shock to different sectors of the economy.

Journal of Economics Library

In the case analysis of the three countries and the IMF, the difference among them was seemingly the strength of state institutions.

Most other studies focus on statistical variables such as labor concentration or income inequality, and not on number of products, or number of intermediate goods. This article used number of enterprises, and included many more variables in its regression, finding that trade not only increases risk, but results in diversification into more business areas, as a pre-caution against Keynesian type shocks. However, some areas of business, particularly manufacturing, made no significant difference. Instead, agricultural and energy diversification emerged in importance. The specific comparison of diversification and specialization is a fairly new to researchers, which made this article difficult, but unique. This article also offers discovers another explanation to the handful of theories explaining intra-industry trade. In this regression, it was shown to reduce risk. As Grubel & Lloyd (1975) wrote, because of the “risk” of supply chain strikes and disturbances, countries “reduce the effects of uncertainty through international diversification of production...” (Grubel & Lloyd, 1975). This has largely been missed by modern economics.

In total, free trade and diversified trade lessens the possibility of calamities, specifically with certain staple goods, which was shown in nearly all parts of the analysis beginning with Great Britain and Ireland, though this was only one of several concerns. From the regressions, countries can take advantage of free trade by trading for similar products, “intra-industry trade,” which was highly significant as reducing risk and expanding the number of firms, so long as competition such as to drive goods from the market (Grubel & Lloyd, 1975). Intermediate parts and vertical trade were found to neither increase nor decrease risks, so perhaps this is a strong area for developing countries and its firms to *start* to grow, as they have in Mexico after NAFTA, although intermediate parts are not included in GDP.

This article finds that trade both increases risks, but also encourages countries to diversify into more firms, at least until they reach a curvilinear point. This article therefore provides much needed new, deductive information, which meets a rising interest in this topic, as risky failures of states convince them to heed to apropos policies. Not all of the statistical data was not conclusive, such as with manufacturing, which still conforms to Ricardian economics of specialization. Nevertheless, this does not minimize that an enormous amount of variables used were highly significant. It is surprising how accurate the statistical hypotheses were, though supply chains apparently caused the discrepancy with some of the variables in the regressions.

In terms of policies, governments, beyond free *and* diversified trade, particularly in developing states, might be best to avoid excessively high tariffs, encourage cross-national joint ventures with diversified leadership, and incentivize firms to diversify and move into more industries, because this will lessen volatility and not only make growth more stable, but also to

T.J. Barry, 7(4), 2020, p.141-175.

Journal of Economics Library

magnify it. Yet, it should come with the insight that there could still be large cyclical swings. Trading with more, and different, countries would also be diversifying, and state agencies should make known accurate and timely information about foreign markets to spur new business creation and competitiveness.

The laws of comparative advantaged goods still hold, and governments should continue to promote comparative advantage goods in trade agreements, and syphon activity into these spheres when possible for efficiency purposes. Simultaneously, they must promote diversity, to help protect against risks. Gains from trading less risky goods should be balanced with productivity lost from trade in non-competitive goods. In larger, more developed economies, risk is less of a problem, given that GDP has the highest beta score. Beta standardizes variables to compare against each other in significance. This study concurs with others in finding that the small, developing countries are the ones most likely to diversify, to avoid risk, but while they grow and become large countries, they start to specialize more, because they can assume the risks, such as by having strong institutional supply chains, democratic rule, and sound macroeconomic policies. Still, institutions may stagnate over time, which will require new statistical testing, as well as to determine if the U shape found here begins to reverse in the other direction.

Even as late as 2020, countries from Japan, to Finland, to Australia, to countless other states not addressed here, years after trade first exploded across the English Channel, are still searching for ways to diversify their economies. Have states stopped, empirically, diversifying when the statistical levels suggest? Japan reached levels of trade for specialization around 2001, but Australia is just nearing this level, and Finland is only at 1/5, but more will be seen as they approach the GDP/capita turning point level. Policies with trade are tricky, and chose should be choose “winners” or “losers,” but, states can go further to offer tax credits, lower tariffs, provide loans, form import/export banks, use managed floats, and seek out public-private partnerships to expand to new fields and products, *and* convince citizens that this will reduce risks and volatility, or increase it if desired. Future research might better regress sundry industries rather than products, or expand on enterprises, the method used in this article, and quantify the several complex conceptual equations. These would certainly both be welcomed additions.

Acknowledgements

This paper was part of a dissertation at the University of Southern Mississippi, for which Dr. Robert J. Pauly, Jr. was Chair, and Dr. Joseph J. St. Marie, Dr. Edward Sayre, and Dr. Tom Lansford were members.

References

- Aslani, A., Helo, P., & Naaranoja, M. (2004). Role of renewable energy policies in energy dependency in Finland: System dynamics approach. *Applied Energy*, 113(1), 758-765. doi. [10.1016/j.apenergy.2013.08.015](https://doi.org/10.1016/j.apenergy.2013.08.015)
- Australian Bureau of Agricultural and Resource Economics and Sciences. (2012). Drought in Australia: Context, policy and management, March. [Retrieved from].
- Australian Bureau of Statistics. (2014). A review of selected regional industrial diversity indexes, 2011, released December 12, 2014. Access on June 28, 2016. [Retrieved from].
- Ayers, C.E. (1962). *The Theory of Economic Progress: A Study of the Fundamentals of Economic Development and Social Change*. 2nd ed. New York: SchockenBooks.
- Barrett, B., & Notaras, M.(2012). Future of food in Japan. *Our World*, posted February 29, 2012. Access on June 23, 2016. [Retrieved from].
- Barry, C. (2008). Australia's long drought withering wheat, rice supplies. *National Geographic News*, May 29.
- Bernstein, W.J. (2008). *A Splendid Exchange*. New York: Grove Press.
- Bigman, D., & Reutlinger, S. (1979). Food price and supply stabilization: National buffer stocks and trade policies. *American Journal of Agricultural Economics*, 61(4), 657-667. doi. [10.2307/1239913](https://doi.org/10.2307/1239913)
- Birt, S. (1753). *The State of the Corn Trade Considered*, London: Booksellers of London and Westminster.
- Bloy, M. (2002). Principles of British foreign policy 1815-1865. Access on February 27, 2015. [Retrieved from].
- Bradsher, K. (2008). A drought in Australia, a global shortage of rice. *New York Times*, April 17.
- Brutti, F. (2010). International trade and technological diversification. University of Zurich, Department of Economics *Working Paper Series*. [Retrieved from].
- Buer, M.C. (1921). The trade depression following the Napoleonic Wars. *Economica* 2(2), 159-179. doi. [10.2307/2547959](https://doi.org/10.2307/2547959)
- Burgess, R., & Donaldson, D. (2010). Can openness mitigate the effects of weather shocks? Evidence from India's famine era. *American Economic Review*, 100(2), 499-453. doi. [10.1257/aer.100.2.449](https://doi.org/10.1257/aer.100.2.449)
- Burke, M., Hsiang, S.M., & Miguel, E.(2015). Global non-linear effect of temperature on economic production. *Nature*, 527, 235-239. doi. [10.1038/nature15725](https://doi.org/10.1038/nature15725)
- Cadot, O., Carrere, C., & Strauss-Kahn, V.(2011). Export diversification: What's behind the hump?, *Review of Economic and Statistics*, 93(2), 590-605. doi. [10.1162/REST_a_00078](https://doi.org/10.1162/REST_a_00078)
- Calabrese, J. (2012). Japan's new energy future and the Middle East, *Middle EastInstitute*, June 11.
- Campbell, J.L. (2004). *Institutional Change and Globalization*. Princeton University Press: Princeton, NJ.
- CESifoDice. (2016). Economic freedom, composite index, 1995-2015. Access on June 1, 2016. [Retrieved from].
- Chang, H.J. (2013). Kicking away the ladder: The 'real' history of free trade. In A. Shakhk (Ed.), *Globalization and the Myths of Free Trade: History, Theory and Empirical Evidence*, (pp.50-68). New York: Routledge.
- Chavas, J. (2008). On the economics of agricultural production. *Australian Journal of Agricultural and Resource Economics*, 52(4), 365-380. doi. [10.1111/j.1467-8489.2008.00442.x](https://doi.org/10.1111/j.1467-8489.2008.00442.x)
- Clark, D.P. (2010). Vertical specialization with developed and developing countries. *Journal of Developing Areas*, 43(2), 327-339. doi. [10.1353/jda.0.0061](https://doi.org/10.1353/jda.0.0061)
- Conley, T. (2014). Australia's China dependence: Do we need a plan B?" *The Conversation*, December 8, 2014.
- Costanza, R, Audley, J., Borden, R., Ekins, P., Folke, C., Funtowicz, S.O., & Harris, J.(1995). Sustainable trade: a new paradigm for world welfare. *Environment: Science and Policy for Sustainable Development*, 37(5), 16-44. doi. [10.1080/00139157.1995.9931065](https://doi.org/10.1080/00139157.1995.9931065)
- De Benedictis, L., Gallegati, M., & Massimo, T. (2007). Overall specialization and income: Countries diversify. *University of Rome CIDEI Working Papers*, No.73.
- Debrett, J. (1800). *Thoughts on the Corn-Trade*. London: T. Burton.

Journal of Economics Library

- Diamond, J. (2005). *Collapse: How Societies Choose to Fail or Succeed*. New York: Penguin.
- Economic Times. (2016). Japan reports biggest trade surplus since 2011, Access on March 17. [Retrieved from].
- Economic Times. (2012). The Nokia effect: Finland's fortunes are affected by one firm. What about other countries?, Access on August 25, 2012. [Retrieved from].
- Economist Group Limited. (2014). A troubling trajectory. *The Economist*, Access on December 13.
- European Commission. (2016). Country report finland. *SWD Staff Working*, No.26/2. [Retrieved from].
- Eurostat. (2012). Euro area government debt up to 90% of GDP, Oct. 24. Newsrelease, Euroindicators. Discontinued- data.
- Eurozone Forecast. (2015). EYGM Ltd. Eurozone rebalancing toward broad-based recovery. Finland. *Oxford Economic*, June 30-31.
- Evans, P. (1995). *Embedded Autonomy: States and Industrial Transformation*. Princeton, NJ: Princeton University Press.
- Fernholz, T. (2011). FTAs Increase Trade, But Impact Can Be Hard to Measure. *Nationjournal.com*, July 17.
- FAOSTAT. (2016). Net capital stock. Access on June 12, 2016, [Retrieved from].
- Frieden, J.A. (2006). *Global Capitalism: Its Rise and Fall in the Twentieth Century*. New York, NY: Jeffry Frieden.
- George, A. & Bennett, A.(2005). *Case Studies and Theory Development in the Social Sciences*. MIT Press: Cambridge, MA.
- Gorodnichenko, Y., Mendoza, E.G, & Tesar, L.L. (2009). The finnish great depression: From Russia with love. *Institute for the Study of Labor*, April.
- Grey, P. (1999). *Famine, Land and Politics: British Government and Irish Society, 1843-1850*. Portland, OR: Irish Academic Press.
- Grieco, J.M., & Ikenberry, G.J. (2003). *State Power and World Markets*. New York, NY: W.W. Norton.
- Grubel, H., & Lloyd, P. (1975). *Intra-industry trade: the theory and measurement of International trade in different products*. London, UK: Macmillan.
- Gulan, A., Haavio, M., & Kilponen, J. (2014). Kiss me deadly: From finnish great depression to great recession. *Bank of Finland Research Discussion Papers*, No.24.
- Hausmann, R., & Rodrik, D. (2003). Economic development as self-discovery, *Journal of Development Economics*, 72(2), 603-633. doi. [10.1016/S0304-3878\(03\)00124-X](https://doi.org/10.1016/S0304-3878(03)00124-X)
- Heckscher, E.F. (1919). The effect of foreign trade on the distribution of income. In E.F. Heckscher & B. Ohlin (Eds), *Heckscher-Ohlin Trade Theory* (Harry Flam and M. June Flanders, Trans.), Cambridge, MA: The MIT Press. (Current edition is 1991).
- Helpman, E. (1981). International trade in the presence of product differentiation, economies of scale, and monopolistic competition: A Chamberlin-Heckscher-Ohlin approach, *Journal of International Economics*, 11(3), 305-340. doi. [10.1016/0022-1996\(81\)90001-5](https://doi.org/10.1016/0022-1996(81)90001-5)
- The Heritage Foundation. (2016a). 2012 Index of economic freedom. [Retrieved from].
- The Heritage Foundation. (2016b). Trade freedom. Economic data on statistics on world economy and economic freedom. Access on June 4, 2016, [Retrieved from].
- Hjerppe, R. (2008). An economic history of Finland, University of Helsinki. Access on June 24, 2016. [Retrieved from].
- Hummels, D., Rapoport, D., & Yi, K.M. (1998). Vertical specialization and the changing nature of world trade. *Federal Reserve Bank of New York Economic Policy Review*, June.
- Imbs, J., & Wacziarg, R. (2000). Stages of diversification, *Stanford University and London School of Business*, Sept.
- The International Monetary Fund & World Bank. (2015). Prospects for global trade, Access on August 4, 2017. [Retrieved from].
- Jiji Press. (2012). Disaster donations top Y520 billion. *The Japan Times*, March 8:1.
- Kalemli-Ozcan, S., Sorensen, B.E. & Yosha, O. (2003). Risk sharing and industrial specialization: Regional and international evidence, *American Economic Review*, 93(3), 903-918. doi. [10.1257/000282803322157151](https://doi.org/10.1257/000282803322157151)

Journal of Economics Library

- Kennedy, D. (2012). Australia faces the end of the Big Dry, *BBC News, Sydney*, Access on July 28, 2017. [[Retrieved from](#)].
- Kinealy, C. (1998). Peel, rotten potatoes and providence: The repeal of the Corn Laws and the Irish Famine, In A. Marrison (Ed.), *Free Trade and its Reception 1815-1960* (vol 1), (pp.50-62), London, UK: Routledge.
- Klinger, B., & Lederman, D. (2004). Discovery and development: An empirical exploration of 'new' products." *World Bank Policy Research Working Paper Series*, No.3450. doi. [10.1596/1813-9450-3450](#)
- Klinger, B., & Lederman, D. (2006). Diversification, innovation, and imitation inside the global technological frontier, *World Bank Policy Research Working Paper*, No.3872. [[Retrieved from](#)].
- Koren, M., & Tenreyro, S. (2004). Diversification and development, *FED of Boston Working Papers*, No.03-3. [[Retrieved from](#)].
- Korgut, B., Walker, G. & Anand, J. (2002). Agency and institutions: national divergences in diversification behavior, *Organization Science*, 13(2), 162-178. doi. [10.1287/orsc.13.2.162.533](#)
- Kreinin, M.E. (2010). *International Economics: A Policy Approach*. New York, NY: Pearson Learning Solutions.
- Krugman, P.R. (1981). Intraindustry specialization and the gains from trade, *Journal of Political Economy*, 89(5), 959-973. doi. [10.1086/261015](#)
- Laidi, Z. (2008). How trade became geopolitics. *World Policy Journal*. Summer.
- Lawn, B. (1801). *The corn trade investigated, and the...*, Salisbury, UK: J. Easton.
- Leontief, W. (1953). Domestic production and foreign trade: The American capital position re-examined, *Proceedings of the American Philosophical Society*, 97(4), 332-349.
- Linder, H.M.F.B. (1961). *An Essay on Trade and Transformation*. Stockholm, Sweden: Almqvist and Wicksell.
- Macro Data Guide. (2016). Aggregate Indicator: Voice & Accountability, Worldwide Governance Indicators, Access on July 28, 2016. [[Retrieved from](#)].
- Malthus, T.R. (1814). *Observations on the Effects of the Corn Laws*. New York, NY: Cosimo Classics. 2012 ed.
- Meti.gov. (2014a). 2014 White paper on small and medium enterprises in Japan. Access on April 25. [[Retrieved from](#)].
- Meti.gov. (2014b). Strategic energy plan. Provisional translation, [[Retrieved from](#)].
- Mishkin, F.S. (2006). *The Next Great Globalization*. Princeton, NJ: Princeton University Press.
- Nation Master. (2012). Government Statistics: Total businesses registered number (per capita) (most recent) by country, Access on October 2012, [[Retrieved from](#)].
- Nelson, R.M., Belkin, P., & Jackson, J.K. (2015). The Greek debt crisis: Overview and implications for the United States. *Congressional Research Service*, 15, 7-5700, R44155.
- North, D.C. (1990). *Institutions, Institutional Change, and Economic Performance*. New York, NY: Cambridge University Press.
- Ohlin, B. (1933). *Interregional and International Trade*. Cambridge, MA: Harvard University Press.
- O'Neill, P. (1996). The trend of aggregate concentration in the United States, *The American Journal of Economics and Sociology*, April.
- OECD. (2017a). ANBERD: business enterprise R&D broken down by industry (ISIC Rev. 4). Access on June 7, 2017. [[Retrieved from](#)].
- OECD. (2015a). Country risk classification, Access on Aug. 25, 2015. [[Retrieved from](#)].
- OECD. (2017b). Exports/Imports. Selected Countries. Access on March 30, 2017. [[Retrieved from](#)].
- OECD. (2017c). Gross domestic product. Access on March 30, 2017. [[Retrieved from](#)].
- OECD. (2016a). International trade-trade in goods and services- OECD data, Access on June, 2016. [[Retrieved from](#)].
- OECD. (2017d). Investment. Selected Countries. Access on March 29, 2017. [[Retrieved from](#)].
- OECD. (2016b). Patents by technology. Access on June, 2016. [[Retrieved from](#)].
- OECD. (2016c). Production and sales (MEI): Manufacturing production index. [[Retrieved from](#)].

Journal of Economics Library

- OECD. (2015b). SDBS structural business statistics. Access on December 1, 2015. [Retrieved from].
- Osterhammel, J., & Petersson, N.P. (2006). *Globalization: A Short History*. Princeton University Press: Princeton, NJ.
- Owen, G. (2005). It takes two to trade. *National Post*, August: A19.
- Oxford English Dictionary. (2015). Risk. Access on October 27, 2015. [Retrieved from].
- Ravallion, M. (1987). Trade and stabilization: Another look at British India's controversial food grain exports." *Explorations in Economic History*, 24(4), 354-370. doi. [10.1016/0014-4983\(87\)90019-2](https://doi.org/10.1016/0014-4983(87)90019-2)
- Rayment, R. (1790). *The Corn-Trade of Great Britain:...* London, UK: T. Whieldon.
- Reilly, B. (2002). Electoral systems for divided societies, *Journal of Democracy*, 13(2), 156-170. doi. [10.17226/9434](https://doi.org/10.17226/9434)
- Ricardo, D. (1817). *The Works and Correspondence of David Ricardo*. In P. Sraffa and M.H. Dobb. (Eds.) Vol I. *On the Principles of Political Economy and Taxation*. Cambridge, UK: Cambridge University Press, (1951 ed.).
- Saint-Paul, G. (1992). Technological choice, financial markets and economic development, *European Economic Review*, 36(4), 763-781. doi. [10.1016/0014-2921\(92\)90056-3](https://doi.org/10.1016/0014-2921(92)90056-3)
- Salvadori, N., & Signorino, R. (2015). Defense versus opulence? An appraisal of the Malthus-Ricardo 1815 controversy on the Corn laws, *History of Political Economy*, 47(1), 151-184. doi. [10.1215/00182702-2847351](https://doi.org/10.1215/00182702-2847351)
- Samuelson, P., & Varian, H.R. (2001). The 'new economy' and information technology policy, *University of California Berkeley*, Access on July 18. [Retrieved from].
- Sawyer, W.C., & Sprinkle, R.L. (2009). *International Economics- 3rd Edition*. Upper Saddle River, NJ: Princeton.
- Schonhardt-Bailey, C. (1991). Specific factors, capital markets, portfolio diversification, and free trade: Domestic determinants of the repeal of the Corn laws, *World Politics*, 43(4), 545-569. doi. [10.2307/2010536](https://doi.org/10.2307/2010536)
- Schonhardt-Bailey, C. (2006). *From the Corn Laws to Free Trade: Interests, Idea, and Institutions in Historical Perspective*. Cambridge, MA: MIT Press.
- Scott, D., Jr., Martin, J.D., Petty, J.W., & Keown, A.J. (1999). *Basic Financial Management- 8th ed.* UpperSaddle River, NJ: Prentice Hall.
- Seneker, H., & Latanotis, D. (1991). Great family fortunes. *The Forbes Four Hundred*, 148(9), 274-296.
- Shediak, R., Abouchakra, R., Moujaes, C.N., & Najjar, M.R. (2008). Economic diversification: The road to sustainable development. Booz and Company, USA. Access on May 2012. [Retrieved from].
- Social Science Research Council. (2016). New voices from Japan, Access on January 2016. [Retrieved from].
- Solow, R. (1956). A contribution to the theory of economic growth, *American Journal of Economics*, 70(1), 65-94. doi. [10.2307/1884513](https://doi.org/10.2307/1884513)
- Statistics Finland. (2016). The growing years of Finland's industrial production, Access on June 21, 2016. [Retrieved from].
- Stiglitz, J.E. (2006). *Making Globalization Work*. New York, NY: W.W. Norton.
- Stolper, W.F., & Samuelson, P. (1941). Protection and real wages, *Review of Economic Studies* 9(1), 58-73. doi. [10.2307/2967638](https://doi.org/10.2307/2967638)
- Storrs, F.J. (1816). *Letters on the Corn-Trade: Containing...* Bristol, UK: Printed by Philip Rose.
- Strategy&. (2008). Economic diversification. Access on August 12, 2008. Formerly Booz & Company. [Retrieved from].
- Thirlwell, M. (2015). How dependent are Australian exports on China? A new research note. *Australian Trade and Investment Commission*, 16 March.
- Tradingeconomics.com. (2017a). 300,000 indicators from 196 countries. Access on May 22, 2017. [Retrieved from].
- Tradingeconomics.com. (2017b). United States wages and salary growth, 1960-2017. Access on June 21, 2017. [Retrieved from].
- Translators on the www. (2016). Finland foreign trade, Access on June 24, 2016. [Retrieved from].

Journal of Economics Library

- United Nations Industrial Development Organization. (2012). Diversification vs. specialization as alternative strategies for economic development: Can we settle a debate by looking at the empirical evidence? Working Paper, March. [Retrieved from].
- United Nations University, UNU-WIDER. (2016). World Income Inequality Database. Access on July 28, 2016. [Retrieved from].
- Vacher and Sons. (1842). *Observations on the Proposed...*, London, UK: Vacher and Sons, 29, Parliament St.
- Vanhaute, E., Paping, R. & O'Grada, C. (2006). The European subsistence crisis of 1845-1850: a comparative perspective. *IEHC 2006 Helsinki Session 123*. Access on August 10, 2015, [Retrieved from].
- Villarreal, A.M. (2017). U.S.-Mexico economic relations: Trends, issues, and implications, *Congressional Research Service*, Access on April 27. [Retrieved from].
- Wacziarg, R. (2007). Stages of diversification. Commission on growth and development, workshop on global trends and challenges. Yale University, Sept. 28-29.
- Westlake, W.C. (1833). *Practical Remarks on the Corn Laws...* London, UK: J.Ridgway.
- Wiig, A., & Kolstad, I. (2012). If diversification is good, why don't countries diversify more? The political economy of diversification in resource-rich countries, *Energy Policy*, 40(1), 196-203. doi. [10.1016/j.enpol.2011.09.041](https://doi.org/10.1016/j.enpol.2011.09.041)
- Williamson, J.G. (2002). Winners and losers over two centuries of globalization. NBER Working Papers, No.9161. doi. [10.3386/w9161](https://doi.org/10.3386/w9161)
- Wooldridge, J.M. (2009). *Introductory Econometrics: A Modern Approach-4th ed.* Mason, OH: South-Western.
- The World Bank. (2016a). Cereal yield (kg per hectare, 1961-2014). Access on June 19, 2016. [Retrieved from].
- The World Bank. (2014). Energy Imports, net (% of energy use). Access on June 2, 2016. [Retrieved from].
- The World Bank. (2016b). GDP percapita (currentUS\$). Access on November 19, 2016. [Retrieved from].
- The World Bank. (2017a). Global Rankings 2007: Logistics performance index. Access on January 29, 2017. [Retrieved from].
- The World Bank. (2016c). Insurance and financial services (% of services exports, BoP). Access on June 3, 2016. [Retrieved from].
- The World Bank. (2017b). New report links increased policy uncertainty and maturing global value chains to weakened trade growth in 2016, Access on August 4, 2017. [Retrieved from].
- The World Bank. (2016d). Research and development expenditure (% of GDP). Access on July 28, 2016. [Retrieved from].
- The World Bank. (2017c). Trade % of GDP, 1960-2016," Access on March 31, 2017. [Retrieved from].
- World Nuclear Association. (2016). Nuclear power in Japan. World Nuclear Association, posted June. [Retrieved from].
- Yi, K. (2003). Can vertical specialization explain the growth of world trade?, *The University of Chicago Press*, 111(1), 52-102. doi. [10.1086/344805](https://doi.org/10.1086/344805)
- Yoo-Duk, K. (2010). Intra-industry trade in an enlarged Europe: Trend of intra-industry trade in the European Union and its determinants, Korea Institute for International Economic Policy. *KIEP Working Paper*, No.10-02.-data.
- Young, W. (1800). *Corn Trade: An Examination of Certain...* London, UK: S.Gosnell.
- Zoellick, R. (2011). Looking beyond aid. Robert Zoellick speech given in Beijing, China, September 5.



Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal. This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by-nc/4.0>).

