WILAYAH: The International Journal of East Asian Studies
Vol. 12, No. 1, 2023, pp.36-75
doi.org/10.22452/IJEAS.vol12no1.4

MATHEMATİCAL APPROACH TO THE ROLE OF INWARD AND OUTWARD FOREIGN DIRECT INVESTORS-LED DIFFUSION OF INNOVATION IN SINO ECONOMIC CONVERGENCE-DIVERGENCE IN LIGHT OF ROGERS' DIFFUSION OF INNOVATION THEORY AND ECONOMİC CONVERGENCE-DİVERGENCE THEORY

Esin Yurdagul[1]

Abstract: In 1962, Everett M. Rogers coined and developed his own theory of Rogers' diffusion of innovation. The last decades have witnessed the fact that innovation has come to be very prominent as a means of economic convergence. Due to the set of the flow data through the amount of Sino inward and outward foreign direct investments remitted by dint of the table between the years of 1980 and 2021, the present research study will analyze the role of inward and outward foreign direct investors-led diffusion of innovation in Sino economic convergence-divergence in light of Rogers' diffusion of innovation theory and economic convergence-divergence theory in the context of mathematics.

Keyword: Mathematical Approach, Foreign Direct Investors, Economic Convergence-Divergence Theory, Rogers' Diffusion of Innovation Theory

INTRODUCTİON

Diffusion is regarded as the process by which an innov ation is communicated through certain channels over time among members of a social system.[2] Meaning act of diffusing, state of being diffuse is used from 1590s and figurative sense of a spreading abroad, dispersion (of knowledge, etc.) is used from 1750s[3]. In my first book titled 'International Human Resource Management: The South Korean Human Resource Management From The Past To The Present Into The Future,' I defined the term of diffusion as a kind of change, transition or transformation in a social system where a process of convergence and/or divergence occurs. Furthermore, convergent or positive diffusion occurs when convergence occurs, and divergent or negative diffusion occurs when divergence occurs.[4] In the literature of economics and innovation, there has been a plurality of perspectives on the concept of convergence. It is most common that convergence has been found in technological terms or in the context of regional economic growth and development within or between countries, yet in the past, the concept of innovation has not been linked to convergence in an explicit manner. In contrast, the last decades have witnessed the emerging role of innovation in the discussions associated with national and sectoral systems of innovations, as well as in the economic growth and development policy of

[1] First and Corresponding Author Esin Yurdagul is chairman-board of trustees of the Thames International University, 250 Bis Boulevard Saint Paris, Germain, 75007, France, Email: komorebi782019@gmail.com.
[2] T.W. Valente and E.M. Rogers, E.M., The origins and development of the diffusion of innovations paradigm as an example of scientific growth, 242-273.
[3] Etymonline, Diffusion.
[4] E. Yurdagul, International human resource management: The South Korean human resource management from the past to the present into the future. For more details on Rogers' diffusion of innovation theory, please see, E. Yurdagul, Rogers' diffusion of innovation: Online games' diffusion of innovation of Japanese Gen Y consumers.

countries. The emerging role of innovation in such discussions, innovations and innovativeness has always been analyzed with help of some proxies like Research and Development investments, patents, etc. and characteristics of innovations and innovation processes have not been taken more systematically into account when new policies are planned and executed, but innovation has come to be very prominent as a means of economic convergence.[5]

ROGERS' DIFFUSION OF INNOVATION THEORY: BELL-SHAPED CURVE AND THE EMPIRICAL RULE FORMULA

In 1962, Rogers' diffusion of innovation theory, which is known as one of the oldest social science theories, was coined and developed by Everett M. Rogers[6]. In his book on diffusion of innovations titled 'Diffusion of Innovations,' he originally defined the diffusion of innovations as 'a communication theory which has laid the groundwork for behavior change models across the social sciences, representing a widely applicable perspective'[7], 'seeks to explain how, why, and at what rate new ideas and technology spread through cultures'[8], and has explained 'how, over time, an idea or product gains momentum and diffuses (or spreads) through a specific population or social system'. The end result of this diffusion is that a new idea, behavior, or product is adopted by people, as part of a social system. Adoption indicates that something differently than what they had previously (i.e., purchase or use a new product, acquire and perform a new behavior, etc.) is done by a person. The key to adoption is that the idea, behavior, or product as new or innovative must be perceived by the person. It is through this that diffusion is possible. Adoption of a new idea, behavior, or product (i.e., innovation) does not occur simultaneously in a social system; rather it is identified as a process whereby some people are more likely to have a tendency to adopt the innovation than others.

---

[5] J. Saarinen and R. van der Have, Convergence in innovation.

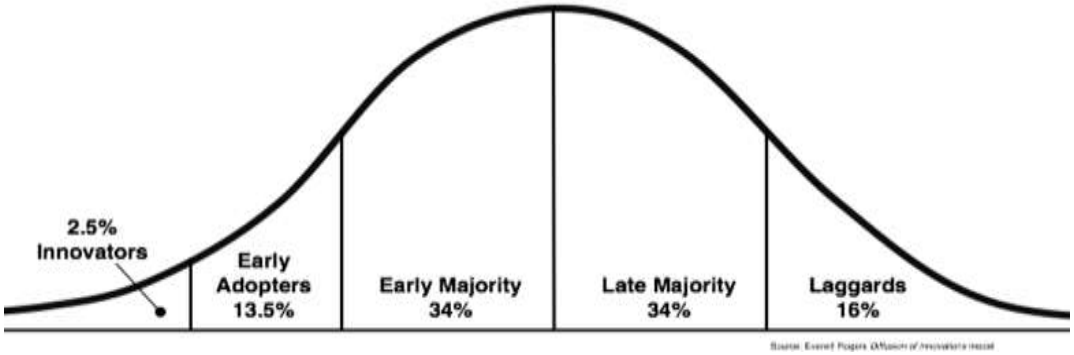
[6] In 1995, Everett M. Rogers indicated that the study of the diffusion of innovation may be traced back to the investigations of Gabriel Tarde, who is French sociologist. Tarde sought to give an explanation to why some innovations were ignored, while others were adopted and spread throughout a society. At the beginning of the 20th century, he witnessed the development of a great number of new inventions, many of which gave rise to social and cultural change. In his book titled 'The Laws of Imitation,' he publicly introduced the S-shaped curve. Although he did not specify and clarify key diffusion concepts, his insights had a tremendous impact on the development of a great number of social scientific disciplines including geography, economics, and anthropology. (G. Tarde, The laws of imitation) A couple of diffusion studies were completed during the 1920s and 1930s. Francis S. Chapin (F.S. Chapin, Cultural change), who is an American sociologist and educator, performed a study of longitudinal growth patterns in diverse kinds of social institutions, and found that the adoption of phenomena such as the commission form of city government was best described by S-shaped curve (S.A. Lowery and M.L. DeFleur, Milestones in mass communication research), which was followed by the diffusion of innovation over time and that later adopters had lower socio-economic status than did innovators and opinion leadership which focused on the role of socio-economic status, i.e., it is more likely that a cosmopolitan individual is to adopt new products. The year 1943 witnessed the diffusion of innovations paradigm, which began with the investigation and publication of the results of a diffusion of hybrid-seed corn which focused on the diffusion of agricultural innovations to farmers, which was conducted by rural sociologists at Iowa State University Bryce Ryan and Neal C. Gross, and had the biggest impact on the methodology, theoretical framework, and interpretations of later student in the rural sociology tradition, and in other research traditions as well. (E.M. Rogers, E.M., Diffusion of innovations) Thus, more than 4000 research publications have become publicly available. The diffusion paradigm spread among Midwestern rural sociological researchers during the 1950s and 1960s, and then a larger, interdisciplinary field of diffusion scholars focused on the diffusion research which came to be a broadly practiced variety of scholarly study in not sociology but also other social sciences, i.e., the spread of new teaching ideas among school personnel was studied by educational researchers; furthermore, in spite of the distinctive nature of these approaches to diffusion research, similar findings were remarkably uncovered by each invisible college. (T.W. Valente and E.M. Rogers, E.M., The origins and development of the diffusion of innovations paradigm as an example of scientific growth, 242-273)

[7] T.W. Valente and E.M. Rogers, E.M., The origins and development of the diffusion of innovations paradigm as an example of scientific growth, 242-273.

[8] C. Manceor, Maloney's 16% rule. For more details, please see, E.M. Rogers, Diffusion of innovations.

Rogers designed five adopter divisions in a system of classification in the following cases where the percentages of any population make up each adopter category under Rogers' diffusion of innovation adoption curve[9]: **(i) Innovators:** people are those who are very willing to become the first to try the innovation. They are very disposed to venture and to take risks and involved in novel ideas, and frequently become the first to develop novel ideas. Very little, if anything, is needed to be done to be attractive to this population. **(ii) Early Adopters:** people are those who are representative for opinion leaders, receive pleasure and satisfaction from leadership roles, and embrace the opportunities for changes. They already acknowledge the necessity for the changes and so are very content with adopting novel ideas. Strategies, which are very attractive to this population, contain how-to manuals and information sheets on implementation. They are not aware of the necessity for information to convince them to change. **(iii) Early Majority:** people are those who are infrequently leaders, yet they adopt novel ideas before the average person. It is very typical that they are aware of the necessity for seeing the evidence that the innovation works before they greatly desire to adopt it. Strategies, which are attractive to this population, contain success stories and evidence of the innovation's effectiveness. **(iv) Late Majority:** people are those who are skeptical of change, and will merely adopt an innovation after the majority tried it. Strategies, which are attractive to this population, contain information on how many other people have tried the innovation and have adopted it in a successful manner. **(v) Laggards:** people are those who act in accordance with tradition, greatly desire to favor traditional values and views, are very skeptical of change and are the hardest group to employ in a given role or position. Strategies, which are attractive to this population, contain statistics, fear appeals, and pressure from people in the other adopter groups.[10] By the late 1960s, rural sociologists were not anymore interested in diffusion studies, not because it was not scientifically effective, but because of lack of support for such research study as a consequence of farm overproduction and because most of the interesting research questions were considered to be answered.[11]

Figure 1: Rogers' diffusion curve or Rogers' innovation curve or Rogers' innovation adoption curve or Rogers' diffusion of innovation adoption curve [12]



It should be mentioned that Rogers' diffusion of innovation adoption curve is a symmetrical bell-shaped curve. The bell-shaped curve depicts a normal probability distribution[13], is

[9] C. Maloney, The secret to accelerating diffusion of innovation: The 16% rule explained.
[10] W.W. LaMorte, Behavioral change models.
[11] T.W. Valente and E.M. Rogers, The origins and development of the diffusion of innovations paradigm as an example of scientific growth, 242-273.
For more details on diffusion theory, please see,
Encyclopedia, Diffusion theory.
[12] Blog.leanmonitor, Early adopters allies launching product.
B. Whitesel, Innovation & charts on accelerating diffusion of innovation & Maloney's 16% rule.
For more details on the bell-shaped curve, please see,
Corporate Finance Institute, What is a bell curve?
D. Mittal, The bell-shaped curve: A common pattern in nature…,
[13] Corporate Finance Institute, What is a bell curve?

frequently used to portray the mathematical concept, and suggests that data[14] reflecting the aggregate outcome of large numbers of unrelated events are prone to result in the bell-shaped curve distribution of values, frequencies, or probabilities of a set of data[15]. While half of the data will fall to the left of the mean μ or the mean value μ or the expected value μ[16] that identifies the position of the center[17], half will fall to the right. This type of pattern[18] implies that one may generate reasonable expectations with regard to the possibility that an outcome

---

The bell-shaped curve owns its name thanks to the bell-shaped curve of the normal probability distribution graph; however, it is not quite correct since the normal probability distribution is not the only probability distribution whose graph demonstrates a bell-shaped curve, i.e., the graphs of the Cauchy and logistic distributions which depict a bell-shaped curve as well (Corporate Finance Institute, What is a bell curve?), all the graphs, which derive from completely different fields of studies and still, they share a similar distribution pattern, Maxwell's Distribution of Velocity Curve, in Kinetic Theory of Gases, the Wein's Displacement Law, in Thermal Radiations, the Distribution of Kinetic Energy of Beta Particles, in Radioactive Decays, the distribution of Intelligence among people in general, the distribution of Salaries in various countries among people (D. Mittal, The bell-shaped curve: A common pattern in nature…,), tests, such as the Scholastic Assessment Test and Graduate Record Examination: the average (C) will be scored by the bulk of students, while a B or D will be scored by smaller numbers of students; furthermore, an F or an A is scored by an even smaller percentage of students score, and hence this gives rise to a distribution that exhibits similarity or likeness to a bell (thus the nickname) (S. Glen, Normal distributions (bell curve): Definition, word problems), heights of people, measurement errors, blood pressure, points on a test, IQ scores, salaries, and the roll of two dice where the distribution is centered around the number seven and the probability decreases as you move away from the center. (D. Russell, Bell curve and normal distribution definition) Regarding normal distribution, it is a mathematically well-defined bell curve that is generally used in statistics, in science (Dictionary, Bell curve), and in probabilistic distributions since the graph of its probability density looks like a bell. It is sometimes defined as De Moivre distribution and as the Gaussian distribution (S. Glen, Normal distributions (bell curve): Definition, word problems) because the German mathematician Carl Gauss firstly coined and described the term normal distribution. (D. Mittal, The bell-shaped curve: A common pattern in nature…,) Larger values of standard deviation σ notices that the data is spread out around the mean μ, more precisely, the normal distribution will be flatter and wider, while smaller values of standard deviation σ notice that the data is tightly clustered around the mean μ; the normal distribution will be taller (S. Glen, Normal distributions (bell curve): Definition, word problems) and make the graph of the bell-shaped normal distribution steeper around the mean μ. At the point of the mean μ is the maximum of the bell-shaped normal distribution function. If the mean μ is smaller, the graph moves further to the left; if it is larger, it shifts to the right. (W.A. Hemmerich, Normal distribution) If the data values in a normal distribution are converted to z-scores in a standard normal distribution the empirical rule gives a description of the percentage of the data, which fall within particular numbers of standard deviations σ from the mean μ for bell-shaped curves. (S.A. McLeod, What is a normal distribution in Statistics?) There exist some kinds of data which do not follow a normal distribution pattern. It is obligatory that such data sets not be forced to try to fit a bell curve; for instance, a classic example would be student grades, which often have two modes. Other types of data that do not follow the curve include income, population growth, and mechanical failures. (D. Russell, Bell curve and normal distribution definition)
For more details, please see,
Mathisfun, Normal distribution.
Mathisfun, Standard normal distribution table.
S.A. McLeod, What is central limit theorem in statistics?

[14] Data may be spread out or distributed in different kinds of ways, i.e., it may be distributed more on the left, or more on the right, or it may be all jumbled up. Some data may be prone to be a central value with no bias left or right, yet other data may be prone to follow it closely, but not perfectly (which is usual). (Mathisfun, Normal distribution)

[15] Dictionary, Bell curve

[16] W.A. Hemmerich, Normal distribution.

[17] S.A. McLeod, What is a normal distribution in Statistics?

[18] This type of pattern is followed by a great number of groups; therefore, it is widely used in business, in statistics and in government bodies like the United States Food and Drug Administration working with United States Government partners, which include Centers for Disease Control and Prevention, and international partners to closely monitor an outbreak that has been caused by the outbreak of the ongoing corona pandemic or the ongoing COVID pandemic or the ongoing COVID-19 pandemic or the ongoing corona virus COVID-19 pandemic or the ongoing COVID-19 or the ongoing COVID-19 global pandemic that was first identified in Wuhan City, Hubei Province, People's Republic of China (The United States Food and Drug Administration (FDA), Bell curve) on 17th November 17, 2019, and was declared a global pandemic by the World Health Organization on 11th March, 2020. (S. Glen, Normal distributions (bell curve): Definition, word problems)

will lie within a range to the left or right of the center, once one has measured the amount of deviation, which 'the difference between an observed value in a series of such values and their arithmetic mean',[19] contained in the data. This may be measured in terms of the standard deviation σ[20], which is defined as 'the square root of the variance, a measure of dispersion in a frequency distribution, equal to the square root of the mean of the squares of the deviations from the arithmetic mean of the distribution, a measure of dispersion obtained by extracting the square root of the mean of the squared deviations of the observed values from their mean in a frequency distribution, a statistic used as a measure of the dispersion or variation in a distribution or set of data, equal to the square root of the arithmetic mean of the squares of the deviations from the arithmetic mean[21], a measure of the dispersion of the data on the bell-shaped curve[22] or how spread out or distributed numbers are[23], assumes control over the spread of the distribution[24], and determines the height and width of the bell (i.e., a large standard deviation σ gives rise to a bell which is short and wide while a small standard deviation σ gives rise to a tall and narrow curve). The bell-shaped curve is the informal name of a graph[25]. Its graph is generated when a line is plotted using the data points for an item which satisfies the criteria of normal distribution.[26] It decreases on either side[27] and obtains a small percentage of the points on both tails and the bigger percentage on the inner part of the curve.[28] It is concentrated around a point in the middle corresponding to the maximum probability[29]; the maximum point or value or the peak of the curve which corresponds to the mean μ of the dataset and represents the most probable event in the dataset while the other events are equally distributed around the peak[30]; the maximum point or the maximum or plural maxima (one assumes local maximum or minimum when there may be higher or lower points elsewhere but not nearby)[31]; and the highest point on the arc of the line or the greatest number of a point included by the center. It slopes downward from this point which is also regarded as the mean μ. However, in simple terms, it is described as the highest number of occurrences of an element or in statistical terms, it is deemed as the mode (the mean μ in the normal probability distribution also equals the median and the mode[32]).[33]

Figure 2: Bell-shaped function with turning points and maximum point[34]

---

[19] Thefreedictionary, Deviation.

[20] S.A. McLeod, What is a normal distribution in Statistics?
"Standard deviation is a statistical index and an estimator, but deviation is not. Standard deviation is a measure of dispersion of a cluster of data from the center, whereas deviation refers to the amount by which a single data point differs from a fixed value." (Differencebetween, Difference between deviation and standard deviation) "In finance, standard deviation is a common metric associated with risk. Standard deviation provides a measure of the volatility of a value in comparison to its historical average. A high standard deviation indicates a lot of value volatility and therefore a high degree of risk." (Caroline Banton, Neoclassical growth theory)

[21] Thefreedictionary, Standard deviation.

[22] Corporate Finance Institute, What is a bell curve?

[23] Mathisfun, Normal distribution.

[24] S. Glen, Normal distributions (bell curve): Definition, word problems.

[25] Corporate Finance Institute, What is a bell curve?

[26] D. Russell, Bell curve and normal distribution definition.

[27] Corporate Finance Institute, What is a bell curve?

[28] S. Glen, Normal distributions (bell curve): Definition, word problems.

[29] Dictionary, Bell curve.

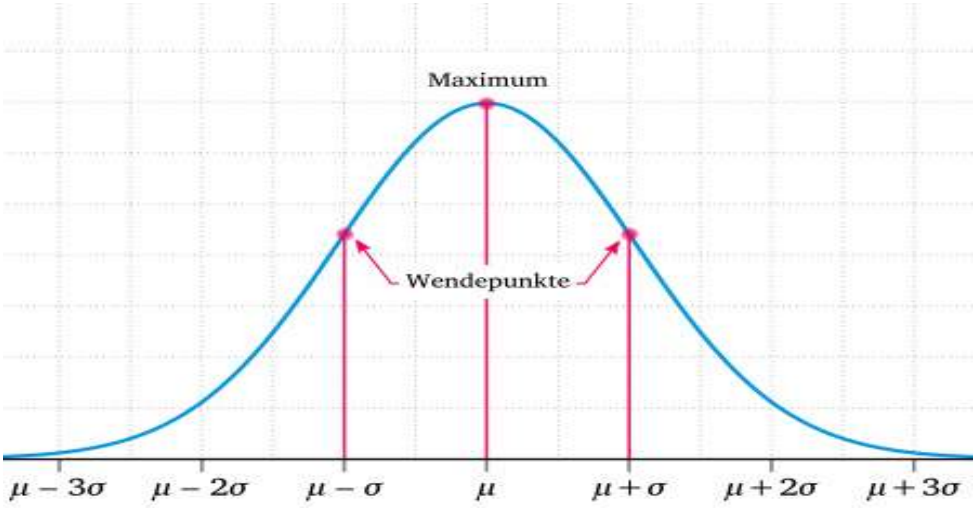
[30] Corporate Finance Institute, What is a bell curve?

[31] Mathisfun, Finding maxima and minima using derivatives, Mathisfun, 2017a.
For more details, please see,
Themathpage, Maximum and minimum values.

[32] Corporate Finance Institute, What is a bell curve?

[33] D. Russell, Bell curve and normal distribution definition.

[34] W.A. Hemmerich, Normal distribution.
German translation of turning point(s): der Wendepunkt (singular form); die Wendepunkte (plural form)
German translation of maximum point: der Maximumpunkt (singular form)



Once one determines the calculation of the mean μ and standard deviation σ and that data is normalized, one may determine the probability that a single data point will fall within the given range of probabilities.[35] The probabilities of the bell-shaped curve and the standard deviation σ share a few important items or relationships that are summarized as follows: **(i)** approximately 68.27% of the area or data or value under the curve falls or lies within one standard deviation σ of/from the mean μ likely, **(ii)** approximately 95.45% of the area under the curve falls or lies within two standard deviations σ of/from the mean μ very likely, and **(iii)** approximately 99.73% of the area under the curve falls or lies within three standard deviations σ of/from the mean μ almost certainly.[36] These aforementioned items described above are sometimes viewed as the three-sigma rule[37] or the empirical rule or the 68-95-99.7 rule where what percentage of data falls within a certain number of standard deviations σ from the mean μ [38]. In mathematical notation, they can be expressed as follows, where X is an observation from a normally distributed random variable, μ is the mean of the distribution, and σ is its standard deviation:

$$\mathbf{Pr\ (\mu - \sigma \leq X \leq \mu + \sigma) \approx 68,\ 27\%}$$

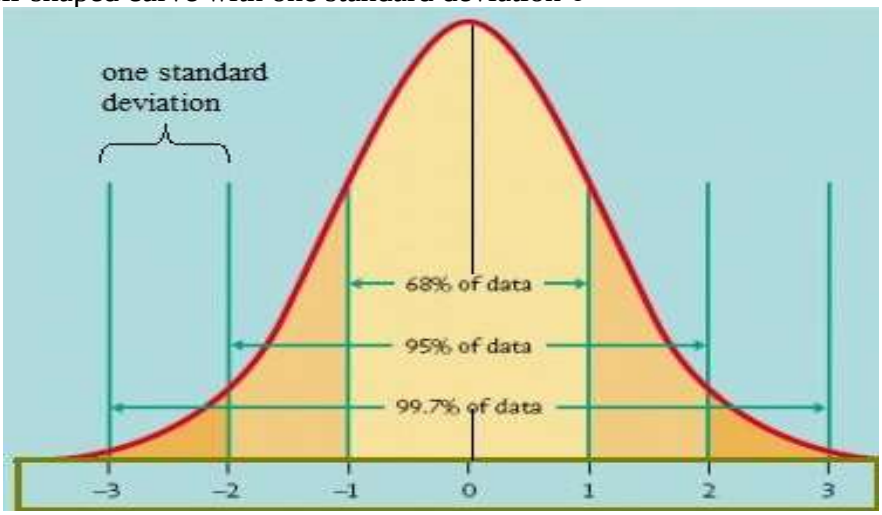
$$\mathbf{Pr\ (\mu - 2\sigma \leq X \leq \mu + 2\sigma) \approx 95,\ 45\%}$$

[35] D. Russell, Bell curve and normal distribution definition.
[36] Corporate Finance Institute, What is a bell curve?
S. Glen, Normal distributions (bell curve): Definition, word problems.
[37] S.A. McLeod, What is a normal distribution in Statistics?
[38] S. Glen, Normal distributions (bell curve): Definition, word problems.
The empirical rule is primarily used to calculate the confidence interval of the normal probability distribution (Corporate Finance Institute, What is a bell curve?) and specifies that with a normal distribution almost all values within three standard deviations σ fall from the mean μ and applies to all normal distributions, regardless of the mean μ and the standard deviation σ. In statistics, the concept of empirical rule formula is extremely important due to the wide applications of the normal probability distribution (i.e., the normal probability distribution is used as a representation of the distribution of random variables whose real distribution is unknown) (Corporate Finance Institute, What is a bell curve?) and permits researchers to determine the proportion of values that fall within certain distances from the mean μ (S.A. McLeod, What is a normal distribution in Statistics?); for instance, human height is normally distributed for a gender. According to statistics from the Socio-Economic Panel from 2006, the expected average size μ for women in Germany is 165.4 cm, and the standard deviation σ is 4.5 cm. From the 68-95-99.7 rule it follows that 68% of all German women have a height between 160.9cm (μ-σ) and 169.9cm (μ + σ), that 95% of all German women have a height between 156.4cm (μ-2σ) and 174.4cm (μ + 2σ), and that 99.7% of all German women have a height between 151.9cm (μ-3σ) and 178.9cm (μ + 3σ). (W.A. Hemmerich, Normal distribution)

$$\mathbf{Pr\ (\mu - 3\sigma \leq X \leq \mu + 3\sigma) \approx 99,\ 73\%}$$[39]

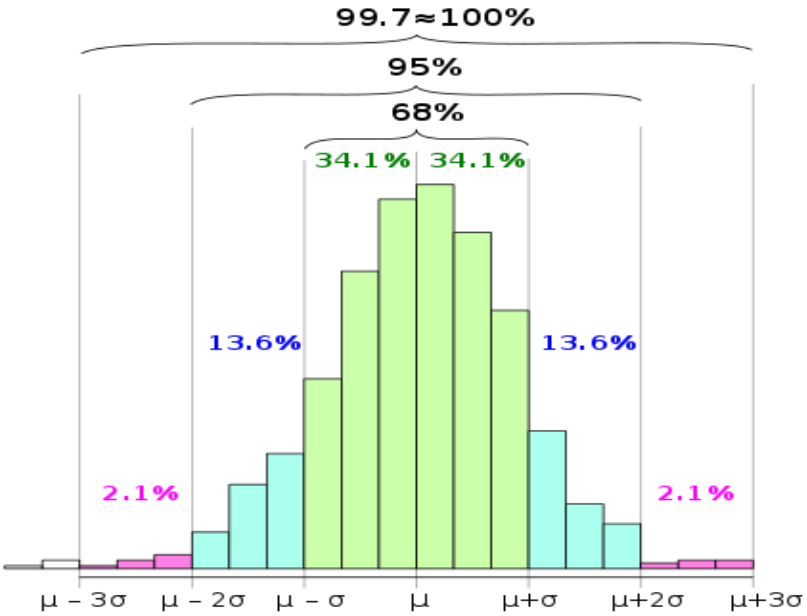
The probabilities of the bell-shaped curve and one standard deviation σ are summarized in the figure below.

Figure 3: Bell-shaped curve with one standard deviation σ [40]



The diffusions of a set of flow data from the standard deviation σ and the mean μ and their effects on the graph of the bell-shaped distribution are summarized in the figure below.[41]

Figure 4: The empirical rule histogram[42]



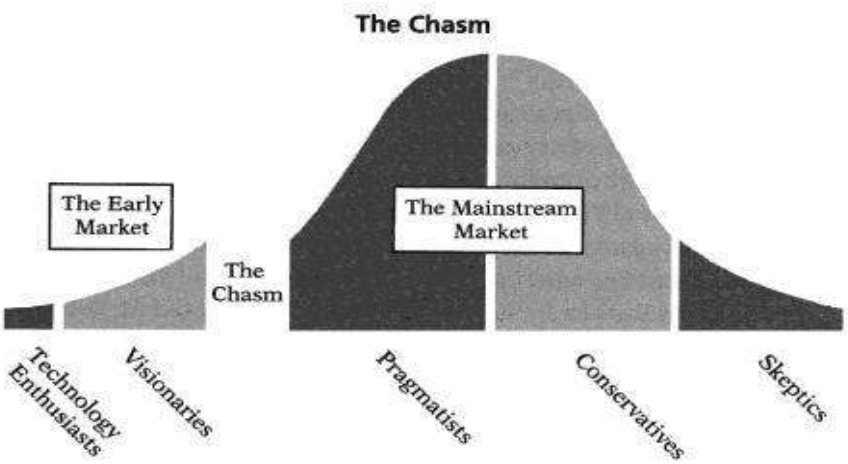
Maloney's 16% rule

Rogers' diffusion of innovation theory indicates that each category of adopters serves as an influencer and reference group for the next, yet there is a problem with Rogers' diffusion of innovation theory which lies between the early adopters and the early majority which do not

[39] W.A. Hemmerich, Normal distribution.
[40] Standard normal model. Image credit: University of Virginia.
S. Glen, Normal distributions (bell curve): Definition, word problems.
[41] W.A. Hemmerich, Normal distribution.
[42] Own work by Melikamp, 23rd December 2017.

reference each other because their psychographics are very different. Rogers defines the early adopters as visionaries and the early majority as pragmatists. In his insightful book titled 'Crossing the Chasm,' Geoffrey Moore defines this gap between the early adopters and the early majority as the chasm. Malcolm Gladwell defines the other side of this chasm as the tipping point or the point where the mainstream market begins with adopting the idea and the sales go through the roof. In his book titled 'Influence: The Psychology of Persuasion,' Robert Cialdini develops a dig into persuasion theory where crossing the chasm to get to the tipping point requires it and introduces six principles of persuasion that are summarized as follows: **(i)** reciprocity, **(ii)** scarcity, **(iii)** liking, **(iv)** authority, **(v)** social proof, and **(vi)** commitment/consistency.[43]

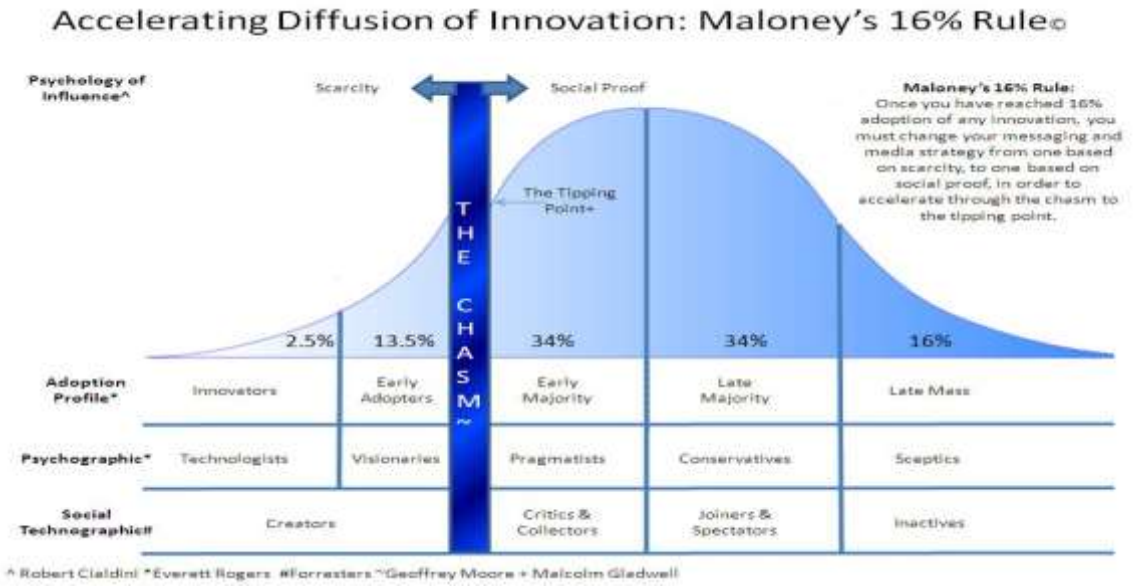
Figure 5: The chasm[44]



In essential, there exist two principles which are extremely relevant for the problem with Rogers' diffusion of innovation theory: scarcity and social proof where innovators and early adopters are turned on more by scarcity and fundamentally want what others cannot have or do not know about; the early majority (and the late majority/laggards) are more turned on by social proof and want what many others have and are talking about; however, the early adopters own a vested interest in the early majority not adopting the innovation because it takes away from their scarcity needs. To bridge this gap, Maloney presented the 16% rule whose theory is based on accelerating diffusion of innovation, at the 2011 ADMA Global Forum and at The Customer Show, Sydney and introduced to a new concept titled 'The Newton Ball Diffusion Acceleration Effect' whose key to this claim was Rogers' diffusion of innovation theory.[45] This is the well-known rule in the marketing industry, pertains to Rogers' diffusion of innovation theory, and is part of the first two categories in the curve. It explains that once one has reached 16% adoption of innovation, one must change messaging and media strategy from one that is based on scarcity, to one that is based on social proof, in order to accelerate through the chasm to the tipping point. It fundamentally states that once any product is taking off in the early stages one must put in more effort for it to reach the higher and middle stages to increase exposure,[46] and also indicates that *"an organization begins with a "scarcity" strategy, i.e. when people perceive something is scarce, it will generate demand … to "social proof" where people begin to do things they see others doing."*[47]

[43] C. Maloney, The secret to accelerating diffusion of innovation: The 16% rule explained.
[44] C. Maloney, The secret to accelerating diffusion of innovation: The 16% rule explained.
[45] C. Maloney, The secret to accelerating diffusion of innovation: The 16% rule explained.
[46] C. Manceor, Maloney's 16% rule.
[47] For more details, please see,
B. Whitesel, Innovation & charts on accelerating diffusion of innovation & Maloney's 16% rule.
For instance, the iPad and how the younger generation uses this kind of product. Early adopters have the iPad; however, they are eventually giving it to their children who lead to an increase and push the product past the

Figure 6: Accelerating diffusion of innovation: Maloney's 16% rule[48]



ECONOMIC CONVERGENCE-DIVERGENCE THEORY

In all convergence theories, *"….the individual in the crowd behaves just as he would behave alone, only more so"*[49], or, more precisely, *"individuals in collective behavior are doing what they wanted to do anyway, but could not or feared to do without the 'facilitating' effect of similar behavior by others."*[50] Economic convergence is regarded as the process by which relatively poorer regions or countries grow faster than their rich counterparts[51] and as catching up. That of economic convergence is considered to be one of the foremost implications of Solow or Solow-Swan model, which was firstly coined and introduced by Robert Solow and Trevor Swan in 1956[52]; for instance, an economy is lagging behind and this will catch up with the economy that is already superior, and eventually both the economies will converge on each other. Economic convergence approach is characterized by the following two types: **(i)** absolute or unconditional convergence, and **(ii)** conditional convergence.[53] Economic divergence is the

---

chasm. The Samsung tap also makes its way through the 16% rule, yet as it is a new product, it is obligatory that it use a great number of means of advertisement and social media to project the product. This helpful philosophy may be a guide to a great number of corporations/companies/firms, which are trying to push through that 16%, and may lead corporations/companies/firms to have a better understanding of how to go about a market and do what it takes to lead to an increase in exposure and production of a product. (C. Manceor, Maloney's 16% rule.)

[48] C. Maloney, The secret to accelerating diffusion of innovation: The 16% rule explained.

[49] F.H. Allport, Social psychology.

[50] Encyclopedia, Collective behavior.

For more details on convergence-divergence approach, please see,

E. Yurdagul, International human resource management: The South Korean human resource management from the past to the present into the future.

[51] S.K. Mathur, Absolute convergence, its speed and economic growth for selected countries for 1961-2001.

[52] Caroline Banton, Neoclassical growth theory.

[53] *"Absolute or unconditional convergence occurs if same savings rate, same rate of population growth, depreciation rate of capital and same production function have been obtained by two countries, the same equilibrium values of capital per capita and income per capita or in other language same steady state position will be obtained by them (i.e., as per the meaning of unconditional convergence, these two countries having the same value for all the parameters will eventually converge and this is unconditional convergence since growth rate of an economy declines as it approaches its steady state position, thus two economies obtaining same steady state situation will finally converge in spite of everything)…Conditional convergence occurs when countries are*

contextual paradigm that is also known as the theory of divergence. It is argued that *'socio-cultural influence is the driving force that will cause individuals from a society to retain the specific values system of the societal culture through time, regardless of other possible influences, such as technological, economic and political change.'*[54]

In 2012, Dervis summarized three fundamental trends as follows: **(i) Divergence in distribution:** The school of thought is involved in the phenomenon of divergence which argues that the exchange, which does not benefit all countries, leads to huge disparities. Consequently, the increase in inequality, which was recorded over the past decade, has led economic theory to be reproduced another almost contradictory phenomenon in its characteristics to that of convergence, which is called divergence or international inequality. Several economists, who are disposed to the existence of a huge disparity between nations on the basis of empirical evidence on the subject, support the divergence.[55] Economic divergence has been greatly influenced by the following occurrences: **(a)** modern colonialism[56] occurred in modern era beginning in the 15th century and witnessing the old imperialism of the 16th and 17th centuries[57], and **(b)** the first Industrial Revolution occurred in the United Kingdom between 1750 and 1850,

---

dissimilar in form of initial stock of capital and income as well as parameters which define savings function then the steady state situation of these two countries will not able to be one and the same (i.e., as per the definition of conditional convergence, in such a scenario, over time the growth rates of these two countries will eventually equalize or converge and this is conditional convergence since the steady state levels of capital per capita and income per capita are dependent on the saving rate, rate of population growth and the position of production function' that is dissimilar across countries." (E. Yurdagul, International human resource management: The South Korean human resource management from the past to the present into the future) Huge objections to the conditional convergence approach were made. Criticism of conditional convergence was not only methodological but also statistical and conceptual in the sense that there may be these kinds of nonlinearities in leading to the existence of technologies in each country, the traditional approach, which implicitly assumes a common linear specification in all economies, concealed this characteristic. (N.F. Wahiba, Convergence and divergence among countries)

For more details, please see,

K. Suthar, Convergence divergence debate within India.

S. Hašková, P. Volf, and V. Machová, Economic convergence of Czech regions in terms of GDP and unemployment rate in response to FDI flows: Do businesses and regions flourish?

[54] D.A. Ralston, The cross-vergence perspective: Reflections and projections.

R.H. Webber, Convergence or divergence.

For more details, please see,

E. Yurdagul, International human resource management: The South Korean human resource management from the past to the present into the future.

[55] N.F. Wahiba, Convergence and divergence among countries.

For more details on economic convergence-divergence theory, please see,

K. Dervis, Convergence, interdependence, and divergence.

E. Yurdagul, International human resource management: The South Korean human resource management from the past to the present into the future.

[56] *"Modern colonialism is traced back to the Age of Discovery: at the beginning of the 15th century, it was the first time that Portugal had been initially looked for new trade routes and searching for civilizations outside of Europe, and thus Ceuta, "a coastal town in North Africa, kicking off an empire that would last until 1999," was conquered by Portuguese explorers in 1415." (E. Blakemore, What is colonialism?; E. Yurdagul, A new perspective on the colonized Korea: Japanese modern colonialism and American neo-colonialism)*

For more details on the impacts of modern colonialism on economy, please see,

J. Robinson and D. Acemoğlu, The economic impact of colonialism.

[57] *"The main focus of Old Imperialism of the 16th and 17th centuries (1450-1650/1700) lied on "Gold, Glory and God" as the motivations for the purpose of exploration. Stories of mythical cities of gold and promises of riches led Europeans to search all over the world, mainly the Americas, tear through native populations, and claim land for their nations. They used the land for the purpose of slave labor and the production of raw materials that they could not produce for themselves, yet this harsh lifestyle, which was enforced by Europeans, was accessible to revolutions and revolts by natives and slaves." (B. Turner and D. Black, New imperialism vs. old imperialism; E. Yurdagul, A new perspective on the colonized Korea: Japanese modern colonialism and American neo-colonialism)*

especially a conspicuously unusual disparity between countries has occurred since the 1820.[58] It had an influence on continual modern colonialism of the 18th and 19th centuries because of the progress made during the time[59], and brought about the beginning process of the rather stark division of the world into the developed or advanced or industrialized or rich or high-income and developing states or countries or economies with the sub-groupings including least-developed, land-locked and small-island developing states or countries or economies and the rise of the second Industrial Revolution which occurred between 1850 and 1914[60], had sharply characterized the world, was the force behind the new imperialism[61] during the late 19th and early 20th centuries assuming a tremendous focus on the extension of a nation's influence over another[62], and was caused by several factors in a significant manner[63].[64] This economic divergence slowed in the aftermath of the conclusion of the World War II (1939-1945), with the end of continual modern colonialism; thus, between the years of 1945 and 1960[65], three dozen new states in Africa and Asia achieved outright independence or autonomy from their European colonial rulers[66]. However, in the mid-20th century, countries had to experience neo-colonialism which was coined in 1956 or 1961[67] and the relative income gap remained stable on average between 1950[68] and 1990.[69] I emphasize that the conclusion of World War II was

---

[58] A. Maddison, L'économie mondiale 1820-1992.
N.F. Wahiba, Convergence and divergence among countries.

[59] E. Yurdagul, A new perspective on the colonized Korea: Japanese modern colonialism and American neo-colonialism.

[60] By the year 1914, Europeans colonized a large majority of the world's nations at some point. (E. Blakemore, What is colonialism?)

[61] D. Parvanova, The industrial revolution was the force behind the New Imperialism.
"New-imperialism is a period of colonial expansion by European powers, the United Sates, and the Empire of Japan during the late 19th and early 20th centuries. Europe had colonies scattered all over the world before that, but at that time the amount of influence Europe had on these regions was minimal. Things changed at the end of the 19th century to a more aggressive and extensive form of imperialism. In this 'New-imperialism,' European countries took over most of the rest of the world between the years 1870 and 1914, and had formal political, economic and social control over the new territories." (D. Parvanova, The industrial revolution was the force behind the New Imperialism; E. Yurdagul, A new perspective on the colonized Korea: Japanese modern colonialism and American neo-colonialism)
For more details, please see,
E. Blakemore, What is colonialism?.
B.S. Chimni, Capitalism, imperialism, and international law in the twenty-first century.
V.I. Lenin, Imperialism, the highest stage of capitalism.

[62] B. Turner and D. Black, New imperialism vs. old imperialism.

[63] T. Getz, Industrial imperialism, the "new" imperialism.

[64] A. Maddison, Contours of the World economy.
K. Dervis, Convergence, interdependence, and divergence.

[65] Pritchett (1997) proposed that the modern economy is identified by a difference of life and productivity levels between developing economies and developed economies which put forth reasons against the debate on global income distribution, which has always been subjected to a lack of representativeness of the samples that were studied because of the lack of reliable historical data for the majority of the least developed economies. In a similar way, Benzidoun (2004) performed a systematic investigation on the evolution of inequality between countries for thirty years, and further denoted the lack of systematic upgrading of rich countries by other poor. This divergence is because of that the majority of countries at both ends of the distribution continuing to stay the same, and countries belonging to the intermediate group in the year 1960 were separated into joining the group of rich countries or poorer. (L. Pritchett, Divergence, big time; I. Benzidoun, 'L'imboglio des inégalités; N.F. Wahiba, Convergence and divergence among countries)

[66] Office of Historian, Milestones: 1945-1952.

[67] For more details, please see,
E. Yurdagul, A new perspective on the colonized Korea: Japanese modern colonialism and American neo-colonialism.

[68] Maddison (1995) has denoted a convergence of North America, Western Europe and Asia East after 1950. (A. Maddison, L'économie mondiale 1820-1992)
N.F. Wahiba, Convergence and divergence among countries.

[69] K. Dervis, Convergence, interdependence, and divergence.

incited by the rise of the global advertisement industry when the multimedia and communications sector gave rise to the beginning process of its trans-border expansion as the advent of television became a cornerstone of advertising and consumerist trends[70] and the beginning of divergent or negative diffusion of innovations in the mid-20th century digital technology and information that has a central role in countries' politics, economy, and social life everywhere[71].[72] I assume that advanced economies have begun to reinvent the mid-20th century digital colonialism, and thus they led emerging and developing economies to experience **new economic divergence under the mid-20th century digital colonialism**, with the exception of some emerging and developing economies that experienced the beginning of convergent or positive diffusion of innovations in the mid-20th century digital technology and information, and thus **new economic convergence under the mid-20th century digital colonialism**, i.e., People's Republic of China. **(ii) New convergence:** The world economy entered a new age of economic convergence around the year 1990, when average per capita incomes in emerging market and developing economies, which were taken as a whole, began to grow much faster than in advanced economies. The division between advanced and developing economies is now weakening. Much of this new convergence may be explained by the following three developments: **(a)** The demographic transition of a greatest number of emerging and a great number of developing economies, which have accompanied slower population growth, argue in favor of greater capital intensity and faster per capita growth. Simultaneously, a great number of such countries have received satisfaction from a golden age as the ratio of the economically active to the total population peaked. It should be mentioned that the share of the aged has witnessed a significant increase in the advanced economies, in particular in Europe and Japan. **(b)** A significant cause of convergence is deemed as the higher proportion of income invested by emerging and developing economies-27.0 percent of gross domestic product over the past decade compared with 20.5 percent in advanced economies. Investments have caused the increase in not only the productivity of labor by giving it more capital to work with, but also total factor productivity[73] by incorporating new knowledge and production techniques and facilitating transition from low-productivity sectors such as agriculture to high-productivity sectors such as manufacturing which has led to the acceleration of catch-up growth. It should be indicated that higher investment rates is especially relevant in Asia-most noticeably, but not only, in People's Republic of China. Asian trend growth rates have witnessed an increase in higher investment rates earlier and to a greater extent than those of other emerging economies. **(c)** The last decades of the 20th century globalization is another remarkable process which is very unique and does not own other alternative or equivalent for comparison; furthermore, it begins manifesting in all spheres of life-economic, social, political, military, cultural, religious, environmental, etc., and thus all the manifestations of globalization lead to a diverse and inevitable effect on the countries' economy[74].[75] By means of strengthened trade links and rising foreign direct investments being carried out by countries' state-owned and non-state-owned multinational corporations/companies/firms, it assists the progress of catch-up growth as latecomers import and adapts know-how and technology. It is much difficult

[70] Adage, History 1950s.
Until the year 1945, there was no international communication theory. (T.L. McPhail, T.L., Global communication: Theories, stakeholders, and trends)
[71] M. Kwet, Digital-colonialism: The evolution of US empire.
[72] T. Elkjaer and J. Damgaard, How digitalization and globalization have remapped the global FDI network.
[73] The joint productivity of capital and labor
[74] I. Pekarskienea and R. Susniene, Features of foreign direct investment in the context of globalization.
For more details on globalization, please see,
E. Yurdagul, Multinational conglomerates of the Korean economic miracle on the Han River in the European Union: The case of the South Korean chaebŏls in Germany.
[75] T. Elkjaer and J. Damgaard, How digitalization and globalization have remapped the global FDI network.

to invent technology than to adapt it. [76] **(d)** I denote the fourth development along with these three developments mentioned by Dervis. Digitalization led emerging and developing economies to experience **new economic convergence under the last decades of the 20th century digital colonialism**. Digital colonialism began to manifest in its contemporary form and promulgated merely after the dissolution of the Soviet Union in 1991.[77]

Digitalization is globalizing economies and makes economic relationships borderless; therefore, traditional macroeconomic statistics, which seek to measure the footprint of the national economy, are being challenged, i.e., the World Trade Organization has been at the centre of negotiations on trade-related aspects of e-commerce since 1998, when the Work Programme on Electronic Commerce was established by its General Council[78], and further global digital platforms allow more countries and smaller corporations/companies/firms and startups, and billions of individuals to participate despite the leadership of advanced economies in most flows[79]. Due to the digitalization, multinational corporations/companies/firms are able to place patents in and sell digital services from offshore financial centers, which dominate global foreign direct investments and are known as the world's largest recipients of foreign direct investments, i.e., the Netherlands, Luxembourg, the United States, People's Republic of China, and the United Kingdom were ranked in the global top five for inward foreign direct investments[80]. Digitalization of the economy may be regarded as the use of internet-based digital technologies for Research and Development, production, and delivery of goods and services.[81] Foreign direct investments, international trade, and dissemination of informational and communicational technologies and activities of multinational corporations/companies/firms are referred to as the most important driving forces of economic globalization and the main broad channels that lead to the spread of economic globalization processes across the countries with different levels of growth and development. Especially, growing foreign direct investments are considered to be a significant factor of globalization process, which is one of the driving forces of globalization, and its main consequence at the same time.[82] Furthermore, they are a key link in new global economic interdependence and interconnectedness[83] and are broadly used to focus on analyzing globalization, attractiveness of an economy, long-term relationships between economies, technology transfer, and real economic activity being generated by multinational corporations/companies/firms.[84] Foreign direct investments as a share of gross domestic product record the value of cross-border transactions, which are associated with direct investments during a given period of time, commonly a quarter or a year and lead to the creation of stable and long-lasting links between

[76] K. Dervis, Convergence, interdependence, and divergence.

[77] For more details on the disintegration of Soviet Union, please see,
P. David and W. Crawley, Satellites over South Asia, broadcasting culture and the public interest.
A. Eijaz and R.E. Ahmad, Electronic colonialism: Outsourcing as discontent of media globalization.
Office of Historian, The collapse of the Soviet Union.

[78] Twailr, Digital colonialism and the world trade organization.

[79] However, trade was once dominated by tangible goods, was largely confined to rich economies and their large multinational corporations/companies/firms, and the global goods trade and financial flows have flattened since the Great Recession occurred between 2007 and 2009. (J. Manyika, S. Lund, J. Bughin,, J. Woetzel, K. Stamenov, and D. Dhingra, Digital globalization: The new era of global flows)

[80] T. Elkjaer and J. Damgaard, How digitalization and globalization have remapped the global FDI network.

[81] T. Elkjaer and J. Damgaard, How digitalization and globalization have remapped the global FDI network.

[82] I. Pekarskienea and R. Susniene, Features of foreign direct investment in the context of globalization,' Procedia-Social and Behavioral Sciences.
For more details on globalization, please see,
E. Yurdagul, Multinational conglomerates of the Korean economic miracle on the Han River in the European Union: The case of the South Korean chaebŏls in German.

[83] For more details on economic interdependence and interconnectedness, please see,
E. Yurdagul, Multinational conglomerates of the Korean economic miracle on the Han River in the European Union: The case of the South Korean chaebŏls in Germany.

[84] T. Elkjaer and J. Damgaard, How digitalization and globalization have remapped the global FDI network.

economies.[85] In order to enhance their capability to attract and retain foreign direct investments, countries and their state-owned and non-state-owned multinational corporations/companies/firms continually enter into rivalry with the adopted and implemented policies[86] and national investment promotion agencies with the mandate have been established by most countries in the world.[87] Moran et al. (2017) have developed five evidence-based suggestions for the advanced economies which aim adopting support of quality foreign direct investments into the developing economies: **(a)** make a contribution to the establishment of Investment Promotion Agencies, **(b)** establish a vendor development program in order to give a support to the match making process between foreign customer and local supplier, **(c)** give a support to the set-up of Export Processing Zones in a way that they act as a spearhead for the domestic economy of the respective developing economies, **(d)** lead to the improvement of the functioning of financial markets worldwide, to allow developing economies bring under control and direct the force of their foreign direct investments, and **(e)** give a financial support and encourage scientific research on efficient policies for the development of developing economies.[88] Thus, digitalization would not cause emerging and developing economies to experience **new economic divergence under the last decades of the 20th century digital colonialism**. It is evident that both inward and outward foreign direct investments have become more critical than ever before. Thus, consequently, countries and their state-owned and non-state-owned multinational corporations/companies/firms continue entering into rivalry with the adopted and implemented policies. Regarding inward foreign direct investments[89], countries receiving inward foreign direct investments gain in a number of ways that can be summarized as follows: **(a)** an increase in gross domestic product[90], initially through the inward foreign direct investments itself, yet this will be followed by a positive multiplier impact on the receiving economy so that the final increase in national income is greater than the initial injection of inward foreign direct investments, **(b)** the creation of jobs, **(c)** an increase in productive capacity that may be illustrated by a shift to the right in the aggregate supply or the production possibility frontier, **(d)** producers own access to the latest technology from abroad, **(e)** less need to import because goods are produced in the domestic economy, **(f)** the positive impact on the country's capital account-inward foreign direct investments serves as an inflow (credit) on the capital account, and **(g)** inward foreign direct investments are a way of compensating for the lack of domestic investment[91] and have long been known as an engine of,

---

[85] OECD, FDI flows
For more details, please see,
E. Yurdagul, India: The inward and outward foreign direct investment.
[86] For more details, please see,
S. Poncet, Inward and outward FDI in China.
[87] For more details, please see,
H. Loewendahl, Innovations in foreign direct investment attraction.
E. Yurdagul, International human resource management: The South Korean human resource management from the past to the present into the future.
[88] T. Moran, H. Görg, A. Serič and C. Krieger-Boden, How to attract quality FDI?
[89] Inward flows of foreign direct investments or inward foreign direct investments are also called direct investment in the reporting economy and cover all liabilities and assets that are transferred between resident direct investment enterprises and their direct investors, and also transfers of assets and liabilities between resident and nonresident fellow enterprises, if the ultimate controlling parent is nonresident. (Worldbank, What is the difference between foreign direct investment (FDI) net inflows and net outflows?) Inward foreign direct investments are the representation of transactions which lead to an increase in the investment that foreign investors own in enterprises resident in the reporting economy, less transactions which lead to a decrease in the investment of foreign investors in resident enterprises. (OECD, FDI flows)
For more details, please see,
E. Yurdagul, India: The inward and outward foreign direct investment.
[90] A.M.K. Al-Shawaf and M.K. Almsafir, Economic globalization: Role of inward and outward FDI with economic growth-evidence from Malaysia.
[91] Economicsonline, Foreign direct investment.

an essential for, and an important source of financing for a country's economic growth[92] and development[93] and their projects have a tremendous effect on economic growth and development in host economies.[94] Regarding outward foreign direct investments[95], it is increasingly evident that outward foreign direct investments lead to an increase in a country's investment competitiveness, crucial for long-term, sustainable growth. Thus, some countries are using outward foreign direct investments as a channel for economic growth[96] and development[97] and a catch-up strategy in order to acquire technology and knowledge, improve product quality throughout the production processes, assess progress toward competitiveness, lead to the augmentation of managerial skills, and gain access to distribution networks.[98] Entry routes are very crucial for the capital exploring country. If the entry route does not need any prior approval and does not obtain any restriction then a capital exploring county can invest in an easy manner.[99] Time is very important to a capital exploring country because it needs to know the situations and other circumstances of the host country. Even if this component plays an important role for a capital exploring country, it is also very important to the host country, since it has to be ready for the outward foreign direct investments of the capital exploring country. If the host country is not in possession of what is required by the capital exploring country, it cannot satisfy and fulfill the needs of the capital exploring country, and thus this leads the capital exploring country to refuse to invest in the host country and this results in the loss or lack of the credibility that is essential for the institutions and policies of the host country. Capital formation or money is essential for the host country. If it has a poor capital formation,

---

[92] Foreign direct investments have not only positive but also significant impact on economic growth and variables that include human capital, economic infrastructure, and further capital formation have positive impact on gross domestic product, yet population, technology gap and inflation have negative impact on the economic growth. (M. Behname, Foreign direct investment and economic growth: Evidence from Southern Asia)

[93] United Nations Economic and Social Commission for Asia and the Pacific, Promoting inward and outward foreign direct investment in the post-coronavirus-disease era.

[94] F.B. Adegboye, R. Osabohien, F.O. Olokoyo, O. Matthew, and O. Adediran, Institutional quality, foreign direct investment, and economic development in sub-Saharan Africa.

[95] Outward flows of foreign direct investments or outward foreign direct investments are called direct investment abroad, and cover assets and liabilities transferred between resident direct investors and their direct investment enterprises, and also transfers of assets and liabilities between resident and nonresident fellow enterprises, if the ultimate controlling parent is resident. (Worldbank, What is the difference between foreign direct investment (FDI) net inflows and net outflows?) Outward direct investments are the representation of transactions which lead to an increase in the investment that investors in the reporting economy own in enterprises in a foreign economy, such as through purchases of equity or reinvestment of earnings, less any transactions which lead to an decrease in the investment that investors in the reporting economy own in enterprises in a foreign economy, such as sales of equity or borrowing by the resident investor from the foreign enterprise. (OECD, FDI flows)
For more details, please see,
E. Yurdagul, India: The inward and outward foreign direct investment.

[96] For more details, please see,
A. Abdulsalam, H. Xu, W. Ameer, A.B. Abdo and J., Xia, Exploration of the impact of China's outward foreign direct investment (FDI) on economic growth in Asia and North Africa along the Belt and Road (B&R) Initiative.
U. Ali, W. Shan, Jian-jun, Wang, and A. Amin, Outward foreign direct investment and economic growth in China: Evidence from asymmetric Ardl approach.
A.M.K. Al-Shawaf and M.K. Almsafir, Economic globalization: Role of inward and outward FDI with economic growth-evidence from Malaysia.

[97] J. Knoerich, How does outward foreign direct investment contribute to economic development in less advanced home countries?

[98] M. Stephenson and J.R. Perea, Outward foreign direct investment: A new channel for development.

[99] M.X. Chen and C. Lin, Foreign investment across the Belt and Road patterns, determinants and effects.
For more details, please see,
M.X. Chen and C. Lin, Foreign investment across the Belt and Road patterns, determinants and effects.
A. Abdulsalam, H. Xu, W. Ameer, A.B. Abdo, and J. Xia, Exploration of the impact of China's outward foreign direct investment (FDI) on economic growth in Asia and North Africa along the Belt and Road (B&R) Initiative.
C. Lons, J. Fulton, De-gang Sun, and N. Al-Tamimi, China's great game in the Middle East.
E. Yurdagul, Towards multidimensional Sino-Turkish relations from the pre-modern era to the present.

it has to struggle with the slow rate of industrial growth. Geographical pros and cons that pertain to the host country should be known and determined by the capital exploring country. The capital exploring country is in need of knowing in which sectors it is permitted to invest in the host country or not. **(iii) Cyclical interdependence:** Since the Asian financial crisis of 1997-1998, cyclical interdependence has occurred that, if anything, may have come to be stronger.[100] It is evident that interdependence has also come to be more complex, with stronger linkages among developing economies. Upturns and downturns in large raw material importers such as People's Republic of China have given rise to an immediate effect on a great number of developing economies' raw material exports. The world economy remains interdependent, where countries' business cycles travel across borders. Emerging and developing economies see much faster economic growth than advanced economies, chiefly as a consequence of supply bubble collapse or overleveraged banks-the correlation with long-term bond yields is much higher that urges that the strength of the financial channel is dependent on the overall situation in world financial markets. There are news about the side factors which include long-term capital accumulation, technological catch-up, and demographics. However, there are cyclical movements around trends, which are associated more with shorter-term demand-side factors, and are also likely to be strongly correlated. There was a decline in recent global growth in early 2012, much more thanks to macroeconomic and financial sector management issues than to long-term supply-side factors, which is a vivid reflection of this worldwide interdependence. The first channel is trade. As one has witnessed an increase in the share of trade in global economic activity, it is expected that the changes in demand in one country, which results from macroeconomic developments in another, will increase; for instance, the impact of a recession in one country spreads across borders by leading to the decrease in the demand for exports from other countries. In theory, if trade encourages greater specialization in production, sector-specific shocks will be prone to lead to the decrease in cyclical interdependence. However, in practice, the macroeconomic demand effects are much more significant. The second channel works by means of increasingly global, huge, and complex financial markets. A new International Monetary Fund report measures spillover effects, which are the impacts of policies in one country on another as a result of the large volume of trade and financial linkages in today's economy-and documents the importance of the financial channel. Using the euro area as an instance, the report is concluded that direct (trade linked) spillovers from stress in the euro area program countries are manageable; however, if the stress were to cast doubt on the soundness of euro area banks, the spillovers to the rest of the world would be large-in many cases as large as after Lehman.[101] According to the findings of the report, it seems that under stressful financial conditions, i.e., from an asset price United States subprime crisis, have a directly impact on credit default swap spreads in emerging markets simply by means of a spread of sentiment[102]. For all these reasons, the delinking of long-term growth trends and continued correlation in cyclical movements exist together at the same time, with global and regional factors that weave the world economy into an interdependent whole.[103] I assume that reinvention of advanced economies has continued with the 21st century data colonialism[104] through the foreign direct investments of their state-owned and non-state-owned multinational corporations/companies/firms that dominate global supply chains as intellectual monopolies. This may be deemed as new economic cyclical interdependence and interconnectedness under

[100] International Monetary Fund, World economic outlook.
M.A. Kose and E.S. Prasad, Emerging markets: Resilience and growth amid global turmoil.
[101] International Monetary Fund, Consolidated spillover report: Implications from the analysis of the systemic-5.
[102] M. Dooley and M.Hutchinson, Transmission of the U.S. subprime crisis to emerging markets: Evidence on the decoupling-recoupling hypothesis.
[103] K. Dervis, Convergence, interdependence, and divergence.
[104] For more details, please see,
M. Kwet, Digital-colonialism: The evolution of US empire.

the 21st century data colonialism. Cross-border and global data flows are surging[105]. The 21st century data colonialism is involved in not only one pole of the Western powers characterized by the 21st century data colonial powers and market capitalists, but also at least two: the United States characterized by the 21st century data colonial power and market capitalist, i.e., in today's world, the five largest multinational corporations/companies/firms such as Google, Amazon, Facebook, Apple, and Microsoft are main actors in the data economy having led to the world's most powerful multinational corporations/companies/firms with a combined market value of nearly US$ 4 Trillion in 2018[106] and People's Republic of China characterized by the 21st century data colonial power and the complex hybrid of commercial and state power, i.e. Baidu, Alibaba and Tencent in People's Republic of China. It works not only externally-on a global scale- but also internally-on its own home populations.[107] Data is captured, stored, transported, analyzed, traded, and sold by these multinational corporations/companies/firms, along with many others in the data economy. Their data troves permitted them to capture enormous economic gains, and thus give them immense market power. Furthermore, it is most likely that people, who actively use the internet and participate in online communities, unknowingly leave behind rapid, real-time trails of their personal data by searching for information on Google, buying a gift on Amazon, liking a cat video on Facebook or ordering their favorite Chinese food on Seamless.

The data economy is formed by the production, collection, distribution and consumption of this data- theirs and billions of others participating. A vast amount of personal data stored in the cloud is used by machine learning algorithms with the aim to detect patterns and relationships, which ultimately have an influence on what they buy, where they go, what they wear, how much they spend and so on. Data firms are permitted by such digital footprints, which are left behind by approximately 4 billion Internet users, to create enormous value.[108] All the aforementioned multinational corporations/companies/firms are characterized by its most well-known principal role players or actors in data colonialism and in the data economy, and they can collectively be the social quantification sector, corporations/companies/firms that are involved in capturing everyday social acts and translating them into quantifiable data being analyzed and being used for the generation of profit. The social quantification sector involves not only big but also small hardware and software manufacturers, developers of social media platforms, and firms that are dedicated to data analysis and brokerage. The latter is a largely unregulated part of the economy, and further becomes more focus on the collection of information from medical, financial, criminal and other records for assigning to a category of individuals through algorithm for the means μ. Those lists to advertisers and other users including governments and law enforcement agencies are packaged and sold by data brokers.[109] I assume that foreign direct investments as the colonial catalyst has become an important role in new economic convergence and divergence under the 20th century digital colonialism and under the last decades of the 20th century digital colonialism, and new economic cyclical interdependence and interconnectedness under the 21st century data colonialism and has become a major catalyst of digitalization of the economy and the data economy.

ESIN'S 16% RULE OF INWARD AND OUTWARD FOREIGN DIRECT INVESTORS-LED DIFFUSION OF INNOVATION UNDER ROGERS' DIFFUSION OF INNOVATION ADAPTATION CURVE

[105] J. Manyika, S. Lund, J. Bughin,, J. Woetzel, K. Stamenov, and D. Dhingra, Digital globalization: The new era of global flows.
[106] NU, Data economy.
[107] N. Couldry and U. Mejias, Data colonialism: Rethinking big data's relation to the contemporary subject.
[108] UN, Data economy.
[109] N. Couldry and U. Mejias, Data colonialism: Rethinking big data's relation to the contemporary subject.

Regarding Esin's 16% rule of inward and outward foreign direct investors-led diffusion of innovation under Rogers' diffusion of innovation adaptation curve to analyze the role of inward and outward foreign direct investors-led diffusion of innovation in economic convergence-divergence in light of Rogers' diffusion of innovation theory and economic convergence-divergence theory in the context of mathematics, I will firstly introduce each of five adopter categories of inward and outward foreign direct investors-led diffusion of innovation under Rogers' diffusion of innovation adaptation curve: (i) The innovative inward and outward foreign direct investors are the innovators in the first adopter category under Rogers' diffusion of innovation adaptation curve and lead to the innovations in inward and outward foreign direct investments and the beginning process of convergent or positive diffusion of innovation in inward and outward foreign direct investments. (ii) The early adaptive inward and outward foreign direct investors are the early adopters in the second adopter category under Rogers' diffusion of innovation adaptation curve, lead to the continual process of convergent or positive diffusion of innovation in inward and outward foreign direct investments through their inhibitors and stimulators who help suppliers of innovations more effectively, and reach the most dangerous %16 diffusion of the innovation adoption crack or chasm under Rogers' diffusion of innovation adoption curve. (iii) The early majority of adaptive inward and outward foreign direct investors are the early majority in the third adopter category under Rogers' diffusion of innovation adaptation curve and cross the most dangerous %16 diffusion of the innovation adoption chasm under Rogers' diffusion of innovation adoption curve, reach the peak of Rogers' diffusion of innovation adoption curve, which corresponds to the mean μ of a set of the inward and outward foreign investment data, and lead to the continual process of convergent or positive diffusion until the maximum innovation in inward and outward foreign direct investments or the most distributed event in the middle of the bell-shaped Rogers' diffusion of innovation adaptation curve. (iv) The late majority of adaptive inward and outward foreign direct investors are the late majority in the fourth adopter category under Rogers' diffusion of innovation adaptation curve and lead to the beginning process of divergent or negative diffusion of innovation in inward and outward foreign direct investments. (v) The late adaptive inward and outward foreign direct investors are the laggards in the fifth adopter category under Rogers' diffusion of innovation adaptation curve and lead to the continual and ending process of divergent or negative diffusion in inward and outward foreign direct investments. It should be mentioned that continuity of diffusion of innovation or convergent or positive diffusion of innovation in inward and outward foreign direct investments may occur between each of five adopter categories under Rogers' diffusion of innovation adaptation curve when attracting the inward foreign direct investments into the country or investing abroad will not be over long periods of time, and thus the momentum may maintain as to create a bandwagon effect that make it natural for the next group to continually diffuse; however, discontunity of diffusion of innovation or divergent or negative diffusion of innovation in inward and outward foreign investments may occur between each of five adopter categories under Rogers' diffusion of innovation adaptation curve when attracting the inward foreign direct investments into the country or investing abroad will be over long periods of time, and thus the momentum may not maintain as to create a bandwagon effect that make it natural for the next group to continually diffuse. Esin's 16% rule of inward and outward foreign direct investors-led diffusion of innovation under Rogers' diffusion of innovation adaptation curve will proceed in the following steps: (i) I will form a set of the flow data through the amount of inward and outward foreign direct investments. (ii) I will analyze whether inward and outward foreign direct investors-led convergent or positive, or divergent or negative diffusion of innovation in inward and outward foreign direct investments between each of five adopter categories under Rogers' diffusion of innovation adaptation curve will occur by normalizing inward and outward foreign direct investment data, which will map the inputs of my training inward and outward foreign direct investment data at each interval under Rogers' diffusion of

innovation adoption curve and will fall in square brackets [μ-3σ, μ+3σ] where more inward and outward foreign direct investments flow standard deviation σ increments will lead to the smoother Rogers' diffusion of innovation adoption curve, and whether the 68-95-99.7 rule will lead to what percentage of convergent or positive, or divergent or negative diffusion of innovation in inward and outward foreign direct investments will fall within a certain number of standard deviations σ from the mean μ. In this sense, I will analyze the set of the flow data with the following steps: (a) Innovativeness in the first adopter category under Rogers' diffusion of innovation adaptation curve: The two following possibilities may occur: (a1) The innovative inward and outward foreign direct investors will not lead to the innovations in inward and outward foreign direct investments and the beginning process of convergent or positive diffusion of innovation in inward and outward foreign direct investments. (a2) The innovative inward and outward foreign direct investors will lead to the innovations in inward and outward foreign direct investments and the beginning process of convergent or positive diffusion of innovation in inward and outward foreign direct investments. This is because the innovative inward and outward foreign direct investors can present how to lead to the creation of a framework which will strengthen and encourage innovation in inward and outward foreign direct investments, as well as the efficacies of inward and outward foreign direct investments, and thus they can make sure that their new ideas or policies or projects or initiatives for boosting inward and outward foreign direct investments are differently diffused in the first adopter category under Rogers' diffusion of innovation adaptation curve to gain competitive advantages. (b) Adaptiveness in the second adopter category under Rogers' diffusion of innovation adaptation curve: Falling into the most dangerous %16 diffusion of the innovation adoption chasm under Rogers' diffusion of innovation adoption curve is regarded as the main issue for the early adaptive inward and outward foreign direct investors-led convergent or positive diffusion in inward and outward foreign direct investments. The two following possibilities may occur: (b1) The early adaptive inward and outward foreign direct investors will not lead to the continual process of convergent or positive diffusion of innovation in inward and outward foreign direct investments through their inhibitors and stimulators who help suppliers of innovations more effectively and will not reach the most dangerous %16 diffusion of the innovation adoption crack or chasm under Rogers' diffusion of innovation adoption curve. (b2) The early adaptive inward and outward foreign direct investors will lead to the continual process of convergent or positive diffusion of innovation in inward and outward foreign direct investments through their inhibitors and stimulators who help suppliers of innovations more effectively and will reach the most dangerous %16 diffusion of the innovation adoption chasm under Rogers' diffusion of innovation adoption curve. This is because there are no different diffusion behaviors of the early adaptive inward and outward foreign direct investors[110], and inward and outward foreign direct investments are attractive enough to the early adaptive inward and outward foreign direct investors who are not to prefer above other traditional alternatives. (c) Adaptiveness in the third adopter category under Rogers' diffusion of innovation adaptation curve: The greater the amount of risk any investor is aiming to take, the greater the potential return. Risks may come in different kinds of ways and investors are in need of being compensated for willing to take on additional risk.[111]Quantifiably, it is usual that risk is assessed by pondering historical behaviors and outcomes. Corporations/companies/firms, financial advisors, and individuals may all lead to the

[110] *"Researchers have found that people who adopt an innovation early have different characteristics than people who adopt an innovation later. When promoting an innovation to a target population, it is important to understand the characteristics of the target population that will help or hinder adoption of the innovation." (W.W. LaMorte, Behavioral change models)*

For more details on Rogers' diffusion of innovation theory, please see,

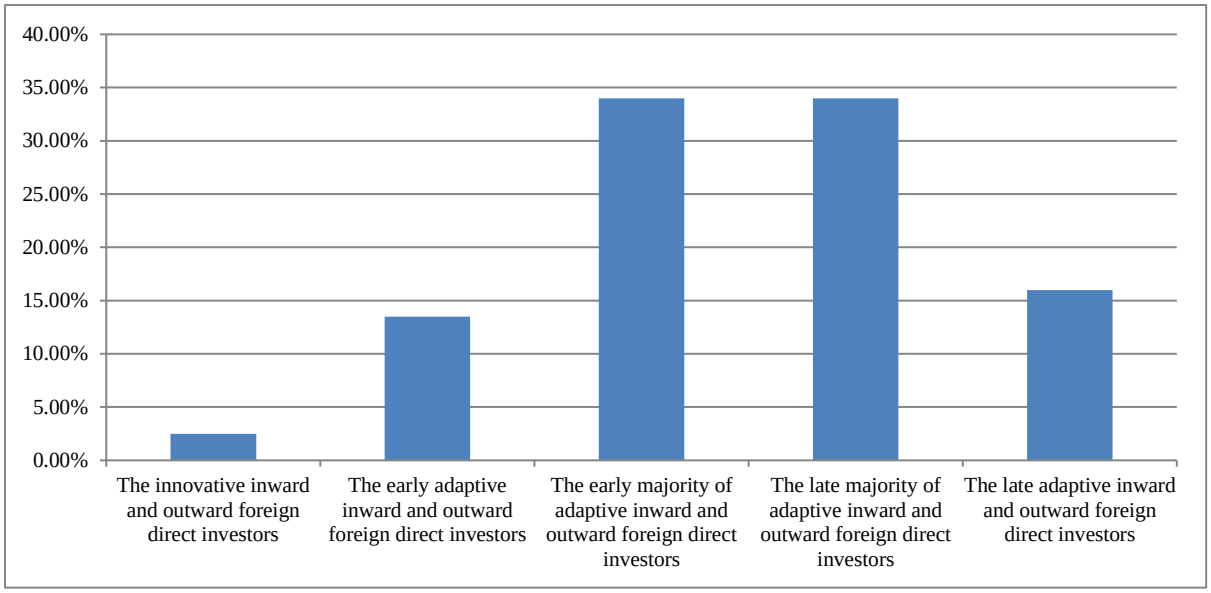
E. Yurdagul, Rogers' diffusion of innovation: Online games' diffusion of innovation of Japanese Gen Y consumers.

[111] FRBSF, Corporate treasury bonds interest rates risk spreads.

development of risk management strategies in order to help manage risks that are related to their inward and outward foreign direct investments and business activities. In academics, there are respectively different kinds of theories, metrics, and strategies which have been defined to analyze, measure, and quantify and manage risks. Some of these contain beta, standard deviation σ, the Capital Asset Pricing Model, and Value at Risk. Measuring and quantifying risk frequently permits business managers, investors, and traders to hedge some risks away by using diverse kinds of strategies that include diversification and derivative positions.[112] The two following possibilities may occur: (c1) The early majority of adaptive inward and outward foreign direct investors will not cross the most dangerous %16 diffusion of the innovation adoption chasm under Rogers' diffusion of innovation adoption curve, will not reach the peak of Rogers' diffusion of innovation adoption curve, which corresponds to the mean μ of a set of the inward and outward foreign investment data, and will not lead to the maximum innovation in inward and outward foreign direct investments or the most distributed event in the middle of the bell-shaped Rogers' diffusion of innovation adaptation curve. (c2) The early majority of adaptive inward and outward foreign direct investors will cross the most dangerous %16 diffusion of the innovation adoption chasm under Rogers' diffusion of innovation adoption curve, will reach the peak of Rogers' diffusion of innovation adoption curve, which corresponds to the mean μ of a set of the inward and outward foreign investment data, and will lead to the continual process of convergent or positive diffusion until the maximum innovation in inward and outward foreign direct investments or the most distributed event in the middle of the bell-shaped Rogers' diffusion of innovation adaptation curve. This is because they can be compensated for taking on additional risks and can assess the risks and opportunities which are followed by inward and outward foreign direct investments by implementing policies for inward and outward foreign direct investments to improve productivity by considering historical behaviors and outcomes, and thus they can develop the risk management strategies including diversification and derivative positions to help manage, measure, quantify, hedge, and minimize the risks associated with their inward and outward foreign direct investments, and they can change their strategy from one based on risk, to one based on return, in order to accelerate through the chasm to the tipping point. (d) Adaptiveness in the fourth adopter category under Rogers' diffusion of innovation adaptation curve: The late majority of adaptive inward and outward foreign direct investors will lead to the beginning process of divergent or negative diffusion of innovation in inward and outward foreign direct investments. (e) Adaptiveness in the fifth adopter category under Rogers' diffusion of innovation adaptation curve: The late adaptive inward and outward foreign direct investors will lead to the continual and ending process of divergent or negative diffusion in inward and outward foreign direct investments. (iii) I will ultimately analyze whether inward and outward foreign direct investors-led convergent or positive, or divergent or negative diffusion of innovation in inward and outward foreign direct investments have a role in economic convergence-divergence of a country in light of Rogers' diffusion of innovation theory and economic convergence-divergence theory in the context of mathematics.

Bar chart without being overlapped: Esin's 16% rule of inward and outward foreign direct investors-led diffusion of innovation under Rogers' diffusion of innovation adaptation curve

[112] James Chen, Risk: What it means in investing, how to measure and manage it.



SINO INWARD AND OUTWARD FOREIGN DIRECT INVESTMENTS

In the aftermath of Deng Xiaoping's rehabilitation in 1977, he promoted four modernization programs including the modernization of agriculture, industry, science and technology, and national defense by the use of practical planning involving capitalistic incentives and techniques[113]. In 1978, the mid-20th century digital technology and information led People's Republic of China to become one of the most significant actors of reinventing the mid-20th century digital colonialism during the period of the transition from liberalism[114] to neo-liberalism[115] and state neo-liberalism[116]. People's Republic of China experienced the beginning of convergent or positive diffusion in the mid-20th century digital technology and information, and thus new economic convergence under the mid-20th century digital colonialism by transforming from a poor country into the world's largest economy and catching up with advanced economies, and it became the power of and one of the most important actors of the mid-20th century digital colonialism. This may be deemed as an exceptional example of that the mid-20th century digital colonized country became the mid-20th century digital colonial power in not only the Asia and the Pacific region but also across the world. In terms of Sino inward and outward foreign direct investments, People's Republic of China has been not just a home country which is a magnet for Sino inward foreign direct investments but also it has been a capital exploring country which is a source of Sino outward foreign direct investments in an increasing and remarkable manner[117] and has begun to play an important role in leading this

[113] Tatsuyuki Ota, The role of special economic zones in China's economic development as compared with Asian Export Processing Zones: 1979-1995.
[114] For more details, please see,
Xingyuan Feng, Weisen Li, and E.W. Osborne, Classical liberalism in China: Some history and prospects.
Xuetong Yan, Chinese values vs. liberalism: What ideology will shape the international normative order?
[115] For more details, please see,
C. Caryl, Strange rebels: 1979 and the birth of the 21st century.
A.L. Friedberg, The authoritarian challenge: China, Russia and the threat to the liberal international order.
I. Weber, Origins of China's contested relation with neoliberalism: Economics, the World Bank, and Milton Friedman at the Dawn of Reform.
E. Yurdagul, Towards multidimensional Sino-Turkish relations from the pre-modern era to the present.
[116] For more details on the state neo-liberalism, please see,
Y. Chu and A.Y. So, State neoliberalism: The Chinese road to capitalism.
E. Yurdagul, Towards multidimensional Sino-Turkish relations from the pre-modern era to the present.
[117] For more details, please see,
S. Poncet, Inward and outward FDI in China.

trend in the convergent diffusion of innovation in Sino inward and outward foreign direct investments[118].[119] With regard to Sino inward foreign direct investments, People's Republic of China began to attract quality inward foreign direct investments which link foreign investors into the local host country economy, i.e., in 1980, Four Special Economic Zones were established and were the first, and until 1984 only, Open Economic Zones[120], in 1984, 14 coastal cities became Open Coastal Cities and were opened to inward foreign direct investments[121], in February 1985, three coastal areas (Pearl River Delta, Southern Fujian Delta, Yangze River Delta) were designated as Open Economic Zones that were endowed with similar preferential incentives to promote export production and inflow of foreign capital[122], in 1990, Economic and Technology Development Zones were established[123], and in the early 1990s, High Technology Development Zones were established and the first two foreign trade agreements were signed[124].[125] As a result, People's Republic of China began to receive the most inward foreign direct investments after 1980, and annual Sino inward foreign direct investments have been over 10 million dollars since 1992.[126] On the one hand, there are weak points for the convergent diffusion of innovation in Sino inward foreign direct investments that include the followings: (i) an ever-changing legal environment, (ii) bureaucratic and administrative complexities, (iii) a lack of transparency and weak intellectual property rights protection, (iv) ageing population, (v) high-level of corporate indebtedness, (vi) production overcapacity in several sectors, (vii) a strongly degraded environmental situation in several big cities, (viii) cultural differences in business practices that may be difficult for foreigners to learn and apply in new business situations, and (ix) underdeveloped middle management and low rate of qualified workers. On the other hand, there are strong points for Sino inward foreign direct investments that include the followings: (i) the largest internal market in the world, with 1.44 billion potential customers, (ii) Sovereign risk contained as public debt remains mainly domestic and denominated in local currency, (iii) importance of foreign currency reserves and public debt owned by Sino government and individuals, (iv) a well-developed production sector (manufacturing sector and heavy industry), (v) a favorable geographic location (close to emerging Asian markets, to Japan, maritime frontage), (vi) top economy in terms of purchasing power parity thanks to rapid growth of the economy, (vii) labor costs remain comparatively

[118] For more details, please see,
S. Poncet, Inward and outward FDI in China.
[119] For more details, please see,
M.X. Chen and C. Lin, Foreign investment across the Belt and Road patterns, determinants and effects.
[120] Wanda Tseng and H. Zebregs, Foreign direct investment in China: Some lessons for other countries.
The Special Economic Zones are originated from the Four Modernizations Slogan, entered a new era when the ongoing development policy needed to be reconsidered as a result of enhanced economic growth in People's Republic of China after the reform-and-open door policy was launched in the late 1970s, and shared some common features with Asian Export Processing Zones that were an integral component of export-oriented industrialization policy package for the newly industrializing economies countries, especially South Korea and Taiwan where the first Asian Export Processing Zones installed at Kaoshiung, Taiwan, as an essential part of outward industrialization strategy was deemed as a key element in Taiwan's economic achievement from thenceforth, was used by former Prime Minister Chou Enlai as early as in 1964. (Tatsuyuki Ota, The role of special economic zones in China's economic development as compared with Asian Export Processing Zones: 1979-1995)
[121] Tatsuyuki Ota, The role of special economic zones in China's economic development as compared with Asian Export Processing Zones: 1979-1995.
[122] H.G. Broadman and Sun Xiaolun, The distribution of foreign direct investment in China.
Tatsuyuki Ota, The role of special economic zones in China's economic development as compared with Asian Export Processing Zones: 1979-1995.
[123] Wanda Tseng and H. Zebregs, Foreign direct investment in China: Some lessons for other countries.
[124] Wanda Tseng and H. Zebregs, Foreign direct investment in China: Some lessons for other countries.
[125] For more details, please see,
M.X. Chen and C. Lin, Foreign investment across the Belt and Road patterns, determinants and effects.
[126] For more details, please see,
S. Poncet, Inward and outward FDI in China.

low, although the situation is changing in certain areas, (viii) new opportunities with the development of the western provinces (particularly Sichuan province), and (ix) development of a new export network (Silk Road network).[127] With regard to Sino outward foreign direct investments, the efforts of the Sino government under the leadership of Chinese Communist Party has led Sino inward foreign direct investments to have been identified as one of the drivers of Sino outward foreign direct investments[128] and to have given rise to the improvement of the capabilities to undertake Sino outward foreign direct investments.[129] For instance, at the government/state level, the Belt and Road Initiative[130] and Shanghai free trade zone[131] have an

[127] Santandertarde, Foreign investment in China.
For more details, please see,
Wanda Tseng and H. Zebregs, Foreign direct investment in China: Some lessons for other countries.

[128] This is because the positive effect of Sino inward foreign direct investments on Sino outward foreign direct investments is stronger in provinces with high economic development, albeit at a diminishing rate over time. Despite the level of corruption, which weakens the effect of Sino inward foreign direct investments on Sino outward foreign direct investments over time, it was found that the effect of Sino inward foreign direct investments on Sino outward foreign direct investments is not contingent on trade openness overall. By decomposing trade openness into two dimensions, that is, import intensity and export intensity, it was also indicated that the effect of Sino inward foreign direct investments on Sino outward foreign direct investments is dependent on export intensity, rather than import intensity. (Jianxun Chen, Wu Zhan, Zhaodi Tong, and Vikas Kumar, The effect of inward FDI on outward FDI over time in China: A contingent and dynamic perspective) Furthermore, Sino non-state-owned multinational corporations are prone to perform better than other foreign firms in environments with weak domestic institutions, possibly because Sino non-state-owned multinational corporations are better at dealing with governments and operating in a country with inefficient domestic institutions (R. Morck, B. Yeung, and M. Zhao, Perspectives on China's outward foreign direct investment) This 'institutional advantage argument' is also supported by cross-country analysis that argues that disadvantages at home due to weak institutions would be able to become advantages abroad (A. Cuervo-Cazurra and M. Genc, Transforming disadvantages into advantages: Developing-country MNEs in the least developed countries).
For more details, please see,
United Nations Economic and Social Commission for Asia and the Pacific, Promoting inward and outward foreign direct investment in the post-coronavirus-disease era.
M.X. Chen and C. Lin, Foreign investment across the Belt and Road patterns, determinants and effects.
A. Cuervo-Cazurra and M. Genc, Transforming disadvantages into advantages: Developing-country MNEs in the least developed countries.
R. Morck, B. Yeung, and M. Zhao, Perspectives on China's outward foreign direct investment For more details, please see,
Wanda Tseng and H. Zebregs, Foreign direct investment in China: Some lessons for other countries.

[129] Better technology, better skills and information with regard to the home economies of inward foreign direct investments are all necessary ingredients for enhancing domestic competitiveness. (R.M. Saada, A.H.M. Noora, and A.H.S. Md Nor, Developing countries' outward investment: Push factors for Malaysia)
For more details on the internationalization of Sino state-owned and non-state-owned multinational corporations, please see,
P.J. Buckley, L.J. Clegg, A.R. Cross, Xin Liu, H. Voss, and Ping Zheng, The determinants of Chinese outward foreign direct investment
M.X. Chen and C. Lin, Foreign investment across the Belt and Road patterns, determinants and effects.
E. Hong and L. Sun, Dynamics of internationalization and outward investment: Chinese corporations' strategies.
S. Poncet, Inward and outward FDI in China.
H.Y. Zhang and D. Van Den Bulcke, International management strategies of Chinese multinational firms.

[130] According to official information, in June 2022, cooperation agreements for the Belt and Road Initiative had been signed by 147 countries. For countries and organizations to join the Belt and Road Initiative, a Memorandum of Understanding was signed by People's Republic of China and the respective country or organization. (C. Nedopil, China Belt and Road Initiative (BRI) Investment Report H1 2022)
For more details, please see,
M.X. Chen and C. Lin, Foreign investment across the Belt and Road patterns, determinants and effects.
Green-BRI, Countries of the Belt and Road initiative (BRI).
For more details on BRI, please see,
The official website of Sino government, Countries of the Belt and Road initiative (BRI).
E. Yurdagul, Towards multidimensional Sino-Turkish relations from the pre-modern era to the present.

[131] For more details, please see,
S. Zhang, Columbia FDI perspectives-The China-United States BIT negotiations: A Chinese perspective.

import role in the convergent diffusion of innovation in Sino inward and outward foreign direct investments. Within Belt and Road Initiative, Sino investors benefit not only advanced but also Belt and Road Initiative countries and People's Republic of China has become the largest investor to invest in the Belt and Road Initiative region.[132] However, there are obstacles to the convergent diffusion of innovation in Sino outward foreign direct investments that are summarized as follows: (i) the credibility of institutions and policies of host nations, which is essential for the credibility of those nations' monetary regimes.[133] (ii) geography of the digital economy cannot be concentrated in People's Republic of China because most of People's Republic of China's tech industry is dominant inside People's Republic of China, save a handful of major products and services, which include 5G (Huawei), CCTV cameras (Hikvision, Dahua), and social media (TikTok) that hold large market shares abroad as well and People's Republic of China has substantial outward foreign direct investments in some foreign tech state-owned and non-state-owned multinational corporations/companies/firms where this hardly suggests a genuine threat to the dominance of the United States having a much larger share of foreign investments as well.[134] In terms of the convergent diffusion of innovation in inward and outward foreign direct investments, despite weak points for the convergent diffusion of innovation in Sino inward foreign direct investments and obstacles to the convergent diffusion of innovation in Sino outward foreign direct investments, People's Republic of China has become the last decades of the 20th century digital colonial economy and the 21st century data colonial economy. It should be emphasized that the real driving force behind the process of the convergent diffusion of innovation in Sino inward and outward foreign direct investments has been the Sino government[135], which is always run by Chinese Communist Party, officially the

J. Williams and X. Zhang, Explorations of inward foreign direct investment: U.S. and China comparative analysis.

[132] M.X. Chen and C. Lin, Foreign investment across the Belt and Road patterns, determinants and effects.
For more details, please see,
A. Abdulsalam, H. Xu, W. Ameer, A.B. Abdo and J., Xia, Exploration of the impact of China's outward foreign direct investment (FDI) on economic growth in Asia and North Africa along the Belt and Road (B&R) Initiative.
P.J. Buckley, L.J. Clegg, A.R. Cross, Xin Liu, H. Voss, and Ping Zheng, The determinants of Chinese outward foreign direct investment.
K.G. Cai, Outward foreign direct investment: A novel dimension of China's integration into the regional and global economy.
Yin-Wong Cheung and Xingwang Qian, Empirics of China's outward direct investment.
J. Fulton, De-gang Sun, and N. Al-Tamimi, China's great game in the Middle East.
P. Hertenstein, D. Sutherland, and J. Anderson, Internationalization within networks: Exploring the relationship between inward and outward FDI in Chinas auto components industry.
Quanlin Li, Sun-hae Lee, and Sae-woon Park, The effect of inward and outward foreign direct investment on regional innovation performance: Evidence from China.
R. Morck, B. Yeung, and M. Zhao, Perspectives on China's outward foreign direct investment.
B. Ramasamy, M. Yeung, and S. Laforet, China's outward foreign direct investment: Location choice and firm ownership.
United Nations Economic and Social Commission for Asia and the Pacific, Promoting inward and outward foreign direct investment in the post-coronavirus-disease era.
Siu-ling Wu and Chien-hsun Chen, An assessment of outward foreign direct investment from China's transitional economy.
Shujie Yao, Wang Pan, Zhang Jing, and Ou Jinghua, Dynamic relationship between China's inward and outward foreign direct investments.
Kefei You, What drives China's outward FDI? A regional analysis.
E. Yurdagul, Towards multidimensional Sino-Turkish relations from the pre-modern era to the present.

[133] J. Grittersová, Borrowing credibility: Global banks and monetary regimes.

[134] M. Kwet, Digital-colonialism: The evolution of US empire.

[135] D. Quer, E. Claver, and L. Rienda, International expansion of Chinese multinationals: The new challenge of globalization.

Communist Party of China[136]. [137] Those are the results of the efforts of the Sino government and its initiatives and effective policies regarding Sino inward and outward foreign direct investments during the period of a transition from liberalism to neo-liberalism and state neo-liberalism.

THE IMPACTS OF THE OUTBREAK OF THE ONGOING COVID-19 GLOBAL PANDEMIC AND THE ONGOING UKRAINE WAR ON SINO INWARD AND OUTWARD FOREIGN DIRECT INVESTMENTS

Economic and production activities, which in turn will impact both the Sino inward and the Sino outward foreign direct investments, have been disrupted by the outbreak of the ongoing COVID-19 global pandemic. Regarding Sino inward foreign direct investments, as the world's second-largest recipient of foreign direct investments, People's Republic of China may face dual pressures in Sino inward foreign direct investments in the aftermath of the ongoing COVID-19 global pandemic. The continuous escalation of the United States-Sino trade war and technological embargo catalyzed by the ongoing COVID-19 global pandemic has aggravated the uncertainty of the external environment. To cope with multiple crises, People's Republic of China is shaping a new dual circulation development pattern where domestic economic circulation is deemed as the principal focus and foundation, thereby buffering and complementing the external circulation. It seems that People's Republic of China likely remains a hot spot for global investment, although the counter-global and decoupling activities have been accelerated by the Presidency of Donald Trump (January 20, 2017-January 20, 2021) in the United States. In large measure, this is due to advantages accumulated over time that have not been eroded by the ongoing COVID-19 global pandemic significantly. This contains its large-scale domestic market, medium to high level per capita wealth as well as long and complete industrial and supply chains. In addition, the swift COVID-19 global pandemic response in People's Republic of China may serve to bolster global commercial confidence in this market. This would indicate that it would remarkably outperform the more gloomy prediction for global cross-border foreign direct investments by United Nations Conference on

---

[136] For more details, please see,
C. Caryl, Strange rebels: 1979 and the birth of the 21st century.
Y. Chu and A.Y. So, State neoliberalism: The Chinese road to capitalism.
John Feng, The rise of China-How Communist Party transformed country into a superpower
Xingyuan Feng, Weisen Li, and E.W. Osborne, Classical liberalism in China: Some history and prospects.
A.L. Friedberg, The authoritarian challenge: China, Russia and the threat to the liberal international order.
I. Weber, Origins of China's contested relation with neoliberalism: Economics, the World Bank, and Milton Friedman at the Dawn of Reform.
Xuetong Yan, Chinese values vs. liberalism: What ideology will shape the international normative order?
E. Yurdagul, Towards multidimensional Sino-Turkish relations from the pre-modern era to the present.
People's Republic of China has nine political parties, which include the Chinese Communist Party and eight other parties, the latter known as 'the eight democratic parties', respectively the Revolutionary Committee of the Chinese Kuomintang, the China Democratic League, the China Democratic National Construction Association, the China Association for the Promoting Democracy, Chinese Peasants' and Workers' Democratic Party, the China Zhigong Party, the Jiusan Society, and the Taiwan Democratic Self-Government League. People's Republic of China's political party system is prescribed as a system of multi-party cooperation by the Constitution; for instance, the Chinese People's Political Consultative Conference is regarded as an important institution or a system of multi-party cooperation and political consultation under the leadership of the Chinese Communist Party; therefore, People's Republic of China has a one-party system, all these aforementioned parties have to be allied to the Chinese Communist Party, and thus Chinese Communist Party as a single party makes decisions unilaterally for the entire country (Byjus, China has eight different political parties yet the leader is always from Chinese Communist Party (CCP)) and run the People's Republic of China. (Chinajusticeobserver, How many political parties are there in China)

[137] For more details, please see,
S. Poncet, Inward and outward FDI in China.

Trade and Development and other multi-lateral organizations, especially the empirical results demonstrate that the dependence of gross domestic product on inward foreign direct investments decreases as per capita gross domestic product increases. Under People's Republic of China's uneven development structure, the per capita gross domestic product of the central and western regions lags behind that of the eastern part. Therefore, it is recommended that People's Republic of China usefully direct more Sino inward foreign direct investments to the central and western regions to promote to lead to the development in these areas. Regarding Sino outward foreign direct investments, as one of the world's top four outward foreign direct investors, People's Republic of China may also face dual pressures in Sino outward foreign direct investments in the aftermath of the the ongoing COVID-19 global pandemic. People's Republic of China's most severe challenge comes from the shrinking investment that has been caused by technology and market blockades and restrictions in developed economies. Hence, People's Republic of China may usefully expand Sino outward foreign direct investments in neighboring areas in order to promote shared regional prosperity while it resists counter-globalization and decouples sentiments and actions. It seems that these kinds of movements likely prompt deeper economic and investment cooperation with countries along the Belt & Road route because these countries are geographically close and have a stronger willingness for two-way trade and investment with People's Republic of China. In addition, it may focus more on bilateral investment and partnership with the developed Asian economies, deepening, i.e., Sino-Singapore connectivity, accelerating the promotion of the People's Republic of China-Japan-Korea Foreign Trade Agreement, and harnessing the benefits of the newly established Regional Comprehensive Economic Partnership and the Sino-European Union Bilateral Investment Agreement in order to improve People's Republic of China's resilience and ability to withstand future external shocks.[138] Along with the ongoing COVID-19 global pandemic and climate disruption, the fallout of the Ukraine war with the triple food, fuel and finance crises, are adding stresses, especially in developing economies. Global growth estimates for the year 2022 are already down by a full percentage point. The momentum for recovery in international investment, which will stall prematurely, hampering efforts to boost finance for sustainable development, may be regarded as a significant risk.[139] The outbreak of the ongoing Ukraine war has turned the spotlight on People's Republic of China. People's Republic of China maintains close ties with Russia not only economically but also geopolitically. People's Republic of China and Russia are regarded as strategic partners in challenging the rules-based order by the Presidency of Joe Biden (January 20, 2021-) in the United States by contesting United States economic interests and global influence.[140] Relations between People's Republic of China and Europe had been progressively deteriorating for years due to a variety of reasons, which range from Beijing's economic policies which include its market distorting practices, industrial policies, and the global investment push challenging European competitiveness-to President Xi Jinping's authoritarian advance in Hong Kong and massive human rights violations in Xinjiang. However, previously, the Sino leadership had either been neutral or even supportive whenever Europe faced a crisis: With Russia's 2008 war against Georgia and the annexation of Crimea in 2014, Beijing stayed on the sidelines. During the global financial crisis in 2008 and the subsequent European sovereign debt crisis, Beijing acted as a stabilizer for international

[138] Jing Fanga, A. Collins, and Shujie Yao, On the global COVID-19 pandemic and China's FDI.
In 2021, both global inward and outward foreign direct investments recovered to pre-COVID-19 global pandemic levels by reaching $1.6 trillion. In particular, international project finance and cross-border deals were strong, and were encouraged by loose financing conditions and infrastructure stimulus, yet the recovery of Greenfield investment in industry is still fragile, particularly in developing economies. It is more likely that this fragile growth of real productive investment is to persist in 2022. (United Nations Conference on Trade and Development, World investment report)
[139] United Nations Conference on Trade and Development, World investment report.
[140] For more details on implications of the Ukraine war, please see,
Bo Hong, Implications of the Ukraine war for China: can China survive secondary sanctions?

markets and even as a supporter of troubled European economies.[141] People's Republic of China and Europe are important partners in trade and investment, but since the start of the Ukraine war, European countries have been reassessing their connections with People's Republic of China due to national security concerns, and have realized the vulnerability of their economies being over-dependent on People's Republic of China. How People's Republic of China reacts to the war and whether People's Republic of China sides with Russia will determine whether western countries, led by the United States, impose secondary sanctions against People's Republic of China.[142]

Table 1: Sino inward and outward foreign direct investment data between the years of 1980 and 2021 (Millions of Dollars)[143]

Year	Sino inward foreign direct investment data	Sino outward foreign direct investment data
1980-1985	718,00	-
1986	1.875,00	-
1987	2.314,00	-
1988	3.194,00	5.277,00
1989	3.393,00	780,00
1990	3.487,00	830,00
1991	4.366,00	913,00
1992	11.156,00	4.000,00
1993	27.515,00	4.400,00
1994	33.787,00	2.000,00
1995	35.849,00	2.000,00
1996	40.180,00	2.114,00
1997	44.237,00	2.563,00
1998	45.463,00	2.634,00
1999	40.319,00	1.775,00
2000	40.715,00	916,00
2001	46.878,00	6.884,00
2002	52.743,00	2.518,00
2003	53.505,00	-152,00
2004	60.630,00	5.498,00
2005	72.406,00	12.261,00
2006	72.715,00	21.160,00
2007	83.521,00	26.510,00
2008	108.312,00	55.910,00
2009	95.000,00	56.530,00
2010	114.734,00	688.811,00
2011	123.985,00	74.654,00
2012	121.080,00	87.804,00
2013	123.911,00	107.844,00

[141] J. Oertel, How COVID-19 and the war in Ukraine could change EU-Taiwan relations.
[142] For more details on implications of the Ukraine war, please see,
Bo Hong, Implications of the Ukraine war for China: can China survive secondary sanctions?
For more details on People's Republic of China's Position on Russia's Invasion of Ukraine, please see,
USCC, China's position in Russia's invasion of Ukraine.
USCC, China-Russia interactions leading up to the invasion of Ukraine.
[143] United Nations Conference on Trade and Development, World investment report.

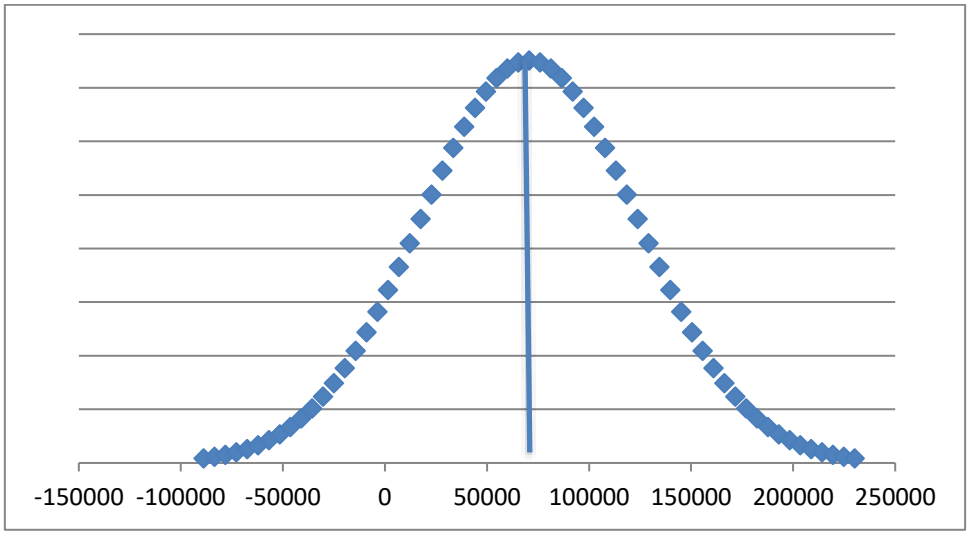
2014	128.502,00	123.120,00
2015	135.577,00	145.667,00
2016	133.711,00	196.149,00
2017	136.315,00	158.288,00
2018	138.305,00	143.037,00
2019	141.225,00	136.905,00
2020	149.432,00	153.710,00
2021	180.957,00	145.190,00

Table 2: Sino normalized inward foreign direct investment data between the years of 1980 and 2021

Standard deviation σ increments	**Inward foreign direct investment data**	**Normalized inward foreign direct investment data**
-3	-88881,37561	8,337E-08
-2,9	-83565,49912	1,11976E-07
-2,8	-78249,62264	1,48902E-07
-2,7	-72933,74615	1,96034E-07
-2,6	-67617,86967	2,55517E-07
-2,5	-62301,99319	3,29735E-07
-2,4	-56986,1167	4,21276E-07
-2,3	-51670,24022	5,32876E-07
-2,2	-46354,36373	6,67333E-07
-2,1	-41038,48725	8,27401E-07
-2	-35722,61076	1,01566E-06
-1,9	-30406,73428	1,23434E-06
-1,8	-25090,8578	1,48518E-06
-1,7	-19774,98131	1,76921E-06
-1,6	-14459,10483	2,0866E-06
-1,5	-9143,228344	2,43643E-06
-1,4	-3827,35186	2,81661E-06
-1,3	1488,524624	3,22371E-06
-1,2	6804,401109	3,65295E-06
-1,1	12120,27759	4,09814E-06
-1	17436,15408	4,55185E-06
-0,9	22752,03056	5,00548E-06
-0,8	28067,90705	5,44955E-06
-0,7	33383,78353	5,87399E-06
-0,6	38699,66001	6,26848E-06
-0,5	44015,5365	6,6229E-06
-0,4	49331,41298	6,92774E-06
-0,3	54647,28947	7,1745E-06
-0,2	59963,16595	7,35613E-06
-0,1	65279,04243	7,4673E-06
1,52656E-15	70594,91892	7,50473E-06
0,1	75910,7954	7,4673E-06
0,2	81226,67189	7,35613E-06
0,3	86542,54837	7,1745E-06
0,4	91858,42486	6,92774E-06

0,5	97174,30134	6,6229E-06
0,6	102490,1778	6,26848E-06
0,7	107806,0543	5,87399E-06
0,8	113121,9308	5,44955E-06
0,9	118437,8073	5,00548E-06
1	123753,6838	4,55185E-06
-1,1	129069,5602	4,09814E-06
1,2	134385,4367	3,65295E-06
1,3	139701,3132	3,22371E-06
1,4	145017,1897	2,81661E-06
1,5	150333,0662	2,43643E-06
1,6	155648,9427	2,0866E-06
1,7	160964,8192	1,76921E-06
1,8	166280,6956	1,48518E-06
1,9	171596,5721	1,23434E-06
2	176912,4486	1,01566E-06
2,1	182228,3251	8,27401E-07
2,2	187544,2016	6,67333E-07
2,3	192860,0781	5,32876E-07
2,4	198175,9545	4,21276E-07
2,5	203491,831	3,29735E-07
2,6	208807,7075	2,55517E-07
2,7	214123,584	1,96034E-07
2,8	219439,4605	1,48902E-07
2,9	224755,337	1,11976E-07
3	230071,2134	8,337E-08

Chart 1: Sino normalized inward foreign direct investment data between the years of 1980 and 2021[144]



[144]United Nations Conference on Trade and Development, World investment report.

Sino inward foreign direct investments under Rogers' diffusion of innovation adoption curve whose mean μ is 70.594,92 and whose standard deviation σ is 53158,76484 demonstrate that

- Pr (70.594,92 - 53158,76484 ≤ X ≤ 70.594,92 + 53158,76484) ≈ 68% of the Sino inward foreign direct investments, which include 34% of Sino inward foreign direct investments made by the early majority of adaptive inward foreign direct investors and 34% of inward foreign direct investments made by the late majority of adaptive inward foreign direct investors, fall between 17.436,15 and 123.753,68.
- Pr (70.594,92 - 2 * 53158,76484 ≤ X ≤ 70.594,92 + 2 * 53158,76484) ≈ 95% of the Sino inward foreign direct investments, which include 34% of Sino inward foreign direct investments made by the early majority of adaptive inward foreign direct investors, 34% of Sino inward foreign direct investments made by the late majority of adaptive inward foreign direct investors, 13,5% of Sino inward foreign direct investments made by the early adaptive inward foreign direct investors and 13,5% of Sino inward foreign direct investments made by the late adaptive inward foreign direct investors, fall between -35722,61076 and 176912,4486.
- Pr (70.594,92 - 3 * 53158,76484 ≤ X ≤ 70.594,92 + 3 * 53158,76484) ≈ 99.7 % of the Sino inward foreign direct investments, which include 34% of Sino inward foreign direct investments made by the early majority of adaptive inward foreign direct investors, 34% of Sino inward foreign direct investments made by the late majority of adaptive inward foreign direct investors, 13,5% of Sino inward foreign direct investments made by the early adaptive inward foreign direct investors, 2,5% of Sino inward foreign direct investments made by the innovative inward foreign direct investors and 16% of Sino inward foreign direct investments made by the late adaptive inward foreign direct investors, fall between -88881,37561 and 230071,2134.

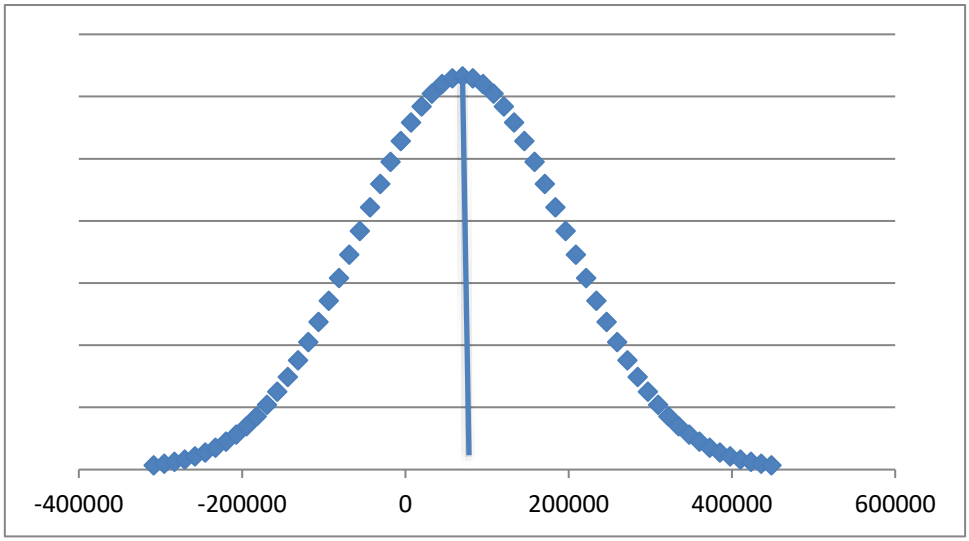
Table 3: Sino normalized outward foreign direct investment data between the years of 1980 and 2021 (Millions of Dollars)

Standard deviation σ increments	**Outward foreign direct investment data**	**Normalized outward foreign direct investment data**
-3	-308294,2953	3,51501E-08
-2,9	-295685,956	4,72111E-08
-2,8	-283077,6168	6,27795E-08
-2,7	-270469,2775	8,26511E-08
-2,6	-257860,9383	1,0773E-07
-2,5	-245252,599	1,39021E-07
-2,4	-232644,2598	1,77617E-07
-2,3	-220035,9205	2,24669E-07
-2,2	-207427,5813	2,81358E-07
-2,1	-194819,242	3,48845E-07
-2	-182210,9027	4,28216E-07
-1,9	-169602,5635	5,20416E-07
-1,8	-156994,2242	6,26174E-07
-1,7	-144385,885	7,45928E-07
-1,6	-131777,5457	8,79742E-07
-1,5	-119169,2065	1,02724E-06
-1,4	-106560,8672	1,18753E-06
-1,3	-93952,52796	1,35917E-06
-1,2	-81344,18871	1,54014E-06

-1,1	-68735,84945	1,72784E-06
-1	-56127,5102	1,91913E-06
-0,9	-43519,17094	2,11039E-06
-0,8	-30910,83169	2,29762E-06
-0,7	-18302,49243	2,47657E-06
-0,6	-5694,153178	2,64289E-06
-0,5	6914,186077	2,79232E-06
-0,4	19522,52533	2,92085E-06
-0,3	32130,86459	3,02489E-06
-0,2	44739,20384	3,10146E-06
-0,1	57347,5431	3,14833E-06
1,52656E-15	69955,88235	3,16411E-06
0,1	82564,22161	3,14833E-06
0,2	95172,56086	3,10146E-06
0,3	107780,9001	3,02489E-06
0,4	120389,2394	2,92085E-06
0,5	132997,5786	2,79232E-06
0,6	145605,9179	2,64289E-06
0,7	158214,2571	2,47657E-06
0,8	170822,5964	2,29762E-06
0,9	183430,9356	2,11039E-06
1	196039,2749	1,91913E-06
1,1	208647,6142	1,72784E-06
1,2	221255,9534	1,54014E-06
1,3	233864,2927	1,35917E-06
1,4	246472,6319	1,18753E-06
1,5	259080,9712	1,02724E-06
1,6	271689,3104	8,79742E-07
1,7	284297,6497	7,45928E-07
1,8	296905,9889	6,26174E-07
1,9	309514,3282	5,20416E-07
2	322122,6675	4,28216E-07
2,1	334731,0067	3,48845E-07
2,2	347339,346	2,81358E-07
2,3	359947,6852	2,24669E-07
2,4	372556,0245	1,77617E-07
2,5	385164,3637	1,39021E-07
2,6	397772,703	1,0773E-07
2,7	410381,0422	8,26511E-08
2,8	422989,3815	6,27795E-08
2,9	435597,7208	4,72111E-08
3	448206,06	3,51501E-08

Chart 2: Sino normalized outward foreign direct investment data between the years of 1980 and 2021[145]

[145] United Nations Conference on Trade and Development, World investment report.



Sino outward foreign direct investments under Rogers' diffusion of innovation adoption curve whose mean μ is 69.955,88 and whose standard deviation σ is 126083,3926 demonstrate that:

- Pr (69.955,88 - 126083,3926 ≤ X ≤ 69.955,88 + 126083,3926) ≈ 68% of the Sino outward foreign direct investments, which include 34% of Sino outward foreign direct investments made by the early majority of adaptive outward foreign direct investors and 34% of Sino outward foreign direct investments made by the late majority of adaptive outward foreign direct investors, fall between -56.127,51 and 196.039,27.
- Pr (69.955,88 - 2 * 126083,3926 ≤ X ≤ 69.955,88 + 2 * 126083,3926) ≈ 95% of the Sino outward foreign direct investments, which include 34% of Sino outward foreign direct investments made by the early majority of adaptive outward foreign direct investors, 34% of Sino outward foreign direct investments made by the late majority of adaptive outward foreign direct investors, 13,5% of Sino outward foreign direct investments made by the early adaptive outward foreign direct investors and 13,5% of outward foreign direct investments made by the late adaptive outward foreign direct investors, fall between -182210,9027 and 322122,6675.
- Pr (69.955,88 - 3 * 126083,3926 ≤ X ≤ 69.955,88 + 3 * 126083,3926) ≈ 99.7% of the Sino outward foreign direct investments, which include 34% of Sino outward foreign direct investments made by the early majority of adaptive outward foreign direct investors, 34% of Sino outward foreign direct investments made by the late majority of adaptive outward foreign direct investors, 13,5% of Sino outward foreign direct investments made by the early adaptive outward foreign direct investors, 2,5% of Sino outward foreign direct investments made by the innovative outward foreign direct investors and 16% of Sino outward foreign direct investments made by the late adaptive outward foreign direct investors, fall between -308294,2953 and 448206,06.

CONCLUSION

This research study was concluded by designing and presenting Esin's 16% rule of inward and outward foreign direct investors-led diffusion of innovation under Rogers' diffusion of innovation adaptation curve to analyze the role of inward and outward foreign direct investors-led diffusion of innovation in Sino economic convergence-divergence in light of Rogers' diffusion of innovation theory and economic convergence-divergence theory in the context of mathematics. After forming a set of the flow data through the amount of Sino inward and outward foreign direct investments remitted by dint of the table between the years of 1980 and

2021, I analyzed whether inward and outward foreign direct investors-led convergent or positive, or divergent or negative diffusion of innovation in Sino inward and outward foreign direct investments between each of five adopter categories under Rogers' diffusion of innovation adaptation curve occured by normalizing Sino inward and outward foreign direct investment data, which mapped the inputs of my training Sino inward and outward foreign direct investment data at each interval under Rogers' diffusion of innovation adoption curve and fell in square bracket [70.594,92 - 3 * 53158,76484, 70.594,92 + 3 * 53158,76484] in terms of Sino inward foreign direct investments where Sino inward foreign direct investment flow standard deviation σ increments went from -3 and 3 in 0.1 increments, and in square bracket [69.955,88 - 3 * 126083,3926, 69.955,88 + 3 * 126083,3926] in terms of Sino outward foreign direct investments where Sino outward foreign direct investment flow standard deviation σ increments went from -3 and 3 in 0.1 increments, and whether the 68-95-99.7 rule led to what percentage of convergent or positive, or divergent or negative diffusion of innovation in Sino inward and outward foreign direct investments fell within a certain number of standard deviations σ from the mean μ. With regard to innovativeness in the first adopter category under Rogers' diffusion of innovation adaptation curve, I found that innovative inward and outward foreign direct investors led to the innovations in Sino inward and outward foreign direct investments and the beginning process of convergent or positive diffusion of innovation in Sino inward and outward foreign direct investments. This was because the innovative inward and outward foreign direct investors could present how to lead to the creation of a framework which would strengthen and encourage innovation in Sino inward and outward foreign direct investments, as well as the efficacies of Sino inward and outward foreign direct investments, and thus they could make sure that their new ideas or policies or projects or initiatives for boosting Sino inward and outward foreign direct investments were differently diffused in the first adopter category under Rogers' diffusion of innovation adaptation curve to gain competitive advantages. **With regard to adaptiveness in the second adopter category under Rogers' diffusion of innovation adaptation curve**, I found that the early adaptive inward and outward foreign direct investors led to the continual process of convergent or positive diffusion of innovation in Sino inward and outward foreign direct investments through their inhibitors and stimulators who helped suppliers of innovations more effectively, and reached the most dangerous %16 diffusion of the innovation adoption chasm under Rogers' diffusion of innovation adoption curve. This was because there were no different diffusion behaviors of the early adaptive inward and outward foreign direct investors, and Sino inward and outward foreign direct investments are attractive enough to the early adaptive inward and outward foreign direct investors who were not to prefer above other traditional alternatives. **With regard to adaptiveness in the third adopter category under Rogers' diffusion of innovation adaptation curve**, I found that the early majority of adaptive inward and outward foreign direct investors crossed the most dangerous %16 diffusion of the innovation adoption chasm under Rogers' diffusion of innovation adoption curve, reached the peak of Rogers' diffusion of innovation adoption curve, which corresponds to the mean μ of a set of the Sino inward and outward foreign investment data, and led to the continual process of convergent or positive diffusion until the maximum innovation in Sino inward and outward foreign direct investments or the most distributed event in the middle of the bell-shaped Rogers' diffusion of innovation adaptation curve. This is because they were compensated for taking on additional risks and could assess the risks and opportunities which are followed by Sino inward and outward foreign direct investments by implementing policies for Sino inward and outward foreign direct investments to improve productivity by considering historical behaviors and outcomes, and thus they can develop the risk management strategies including diversification and derivative positions to help manage, measure, quantify, hedge, and minimize the risks associated with Sino inward and outward foreign direct investments, and they can change their strategy from

one based on risk, to one based on return, in order to accelerate through the chasm to the tipping point.

In 1978, due to the mid-20th century digital technology and information, People's Republic of China became one of the most significant actors of reinventing the mid-20th century digital colonialism during the period of the transition from liberalism to neo-liberalism and state neo-liberalism. People's Republic of China had an experience of the beginning of convergent or positive diffusion in the mid-20th century digital technology and information, and hence new economic convergence under the mid-20th century digital colonialism by transforming from a poor country into the world's largest economy and catching up with advanced economies, and it came to be the power of and one of the most important actors of the mid-20th century digital colonialism. This was the exceptional example of that the mid-20th century digital colonized country came to be the mid-20th century digital colonial power in not only the Asia and the Pacific region but also across the world. In connection with Sino inward and outward foreign direct investments, People's Republic of China has come to be not just a home country that is a magnet for Sino inward foreign direct investments but it is also a capital exploring country which is a source of Sino outward foreign direct investments in an increasing and remarkable manner and has begun to have an important role in leading this trend in the convergent diffusion of innovation in Sino inward and outward foreign direct investments. In respect of the convergent diffusion of innovation in Sino inward and outward foreign direct investments, in spite of weak points for the convergent diffusion of innovation in Sino inward foreign direct investments and obstacles to the convergent diffusion of innovation in Sino outward foreign direct investments, People's Republic of China has come to be the last decades of the 20th century digital colonial economy and the 21st century data colonial economy. The real driving force behind the process of the convergent diffusion of innovation in Sino inward and outward foreign direct investments has been the Sino government under the rule of Chinese Communist Party. Those are the results of the efforts of the Sino government and its initiatives and effective policies with regard to Sino inward and outward foreign direct investments during the period of a transition from liberalism to neo-liberalism and state neo-liberalism. The findings also show that Sino inward foreign direct investments had a tremendous impact on Sino outward foreign direct investments, and further convergent or positive diffusion of innovation in Sino inward foreign direct investments are diffused much more rapidly than that of Sino outward foreign direct investments. I assume that this especially resulted in the aforementioned strong points for Sino inward foreign direct investments. **With regard to adaptiveness in the fourth adopter category under Rogers' diffusion of innovation adaptation curve**, I found that the late majority of adaptive inward and outward foreign direct investors led to the beginning process of divergent or negative diffusion of innovation in Sino inward and outward foreign direct investments. **With regard to adaptiveness in the fifth adopter category under Rogers' diffusion of innovation adaptation curve**, I found that the late adaptive inward and outward foreign direct investors led to the continual and ending process of divergent or negative diffusion in Sino inward and outward foreign direct investments. I also assume that People's Republic of China will become an important actor regarding the trends that will give rise to political, social, and geo-strategic implications that will form and design future policies and will lead the world economy to be a much more differentiated and multi-polar world economy, i.e., a large dependence of the future of the world economy on the interaction between the rise of a great number of large emerging and developing economies that is possibly reflected in their state-owned and non-state-owned multinational corporations/companies/firms, the increasing interdependence and interconnectedness across economies, and the widening gap between the convergent diffusion of innovation in inward and outward foreign direct investments, both within countries and for the world population as a whole, and thus it will continue to be a leading role in future economic convergence and divergence, and future economic cyclical interdependence and interconnectedness and its subculture elements may become the key of

inward and outward foreign direct investors-led convergent or positive, or divergent or negative diffusion of innovation in inward and outward foreign direct investments for such cultures. New ideas and innovations regarding Sino inward and outward foreign direct investments' initiatives and effective policies spread through culture of People's Republic of China and innovative inward and outward foreign direct investors interact with others all around the world. Thus, Sino inward and outward foreign direct investments' initiatives and effective policies are not only preference for the adaptive inward and outward foreign direct investors within the country, but also for the other countries' adaptive inward and outward foreign direct investors, i.e., the emerging and developing economies witnessing divergent or negative diffusion of innovation in their inward and outward foreign direct investments. The adaptive inward and outward foreign direct investors within the emerging and developing economies may internalize and gain more opportunities by leading to the presentation of the use and efficacies of the convergent diffusion of innovation in Sino inward and outward foreign direct investments and the establishment of a strong reference base, i.e., the Belt and Road Initiative, East Asian Export Processing Zones that may be applicable to the Special Economic Zones, Shanghai free trade zone, Open Coastal Cities, Open Economic Zones, Economic and Technology Development Zones, and High Technology Development Zones.

REFERENCES

A. Abdulsalam, H. Xu, W. Ameer, A.B. Abdo, and J. Xia, "Exploration of the impact of China's outward foreign direct investment (FDI) on economic growth in Asia and North Africa along the Belt and Road (B&R) Initiative," *Sustainability* 13, no. 1623 (2021).

A. Cuervo-Cazurra and M. Genc, "Transforming disadvantages into advantages: Developing-country MNEs in the least developed countries," *Journal of International Business Studies* 39, no. 6 (2008): 957-979.

A. Eijaz and R.E. Ahmad, "Electronic colonialism: Outsourcing as discontent of media globalization," *American International Journal of Contemporary Research* 1, no. 3 (2011).

A. Maddison, "L'économie mondiale 1820-1992," *Etude du Centre de Développement de l'OCDE*, (1995).

A. Maddison, *Contours of the World economy, 1-2030AD*, (Oxford University Press, 2007).

A.L. Friedberg, "The authoritarian challenge: China, Russia and the threat to the liberal international order," *The Sasakawa Peace Foundation*, (2018).

A.M.K. Al-Shawaf and M.K. Almsafir, "Economic globalization: Role of inward and outward FDI with economic growth-evidence from Malaysia," *Journal of Business and Retail Management Research* 10, no. 2 (2016).

Adage, "History 1950s," *Adage*, 2022, https://adage.com/article/adage-encyclopedia/history-1950s/98701.

B. Ramasamy, M. Yeung, and S. Laforet, "China's outward foreign direct investment: Location choice and firm ownership," *Journal of World Business* 47, no. 1 (2012): 17-25.

B. Turner and D. Black, "New imperialism vs. old imperialism," *Fivebale*, (2020).

B. Whitesel, "Innovation & charts on accelerating diffusion of innovation & Maloney's 16% rule," *Churchhealthwiki*, (2015).

B.S. Chimni, "Capitalism, imperialism, and international law in the twenty-first century," *Oregon Review of International Law* 14, (2011).

Blog.leanmonitor, "Early adopters allies launching product," *Blog.leanmonitor*, 2022, http://blog.leanmonitor.com/early-adopters-allies-launching-product/

Bo Hong, "Implications of the Ukraine war for China: can China survive secondary sanctions?" *Journal of Chinese Economic and Business Studies*, (2022).

Byjus, "China has eight different political parties yet the leader is always from Chinese Communist Party (CCP)," *Byjus,* 2022, https://byjus.com/question-answer/china-has-eight-different-political-parties-yet-the-leader-is-always-from-chinese-communist-party/
C. Caryl, *Strange rebels: 1979 and the birth of the 21st century,* (Basic Books, 2014), 21-32, 117-126, 169-180, 243-260, 327-338.
C. Lons, J. Fulton, De-gang Sun, and N. Al-Tamimi, "China's great game in the Middle East," *European Council on Foreign Relations,* (2019).
C. Maloney, "The secret to accelerating diffusion of innovation: The 16% rule explained," *Innovateordie,* (2010).
C. Maloney, "The 16% rule: The secret to accelerating diffusion of innovation (presentation slides)," *Innovateordie,* (2011).
C. Manceor, "Maloney's 16% rule," *Catherinemanceor.blogspot,* (2017).
C. Nedopil, "China Belt and Road Initiative (BRI) Investment Report H1 2022," *Green Finance & Development Center,* (2022).
Caroline Banton, "Neoclassical growth theory," *Investopedia,* November 22 2020, https://www.investopedia.com/terms/n/neoclassical-growth-theory.asp
Chinajusticeobserver, "How many political parties are there in China," *Chinajusticeobserver,* 2022, https://www.chinajusticeobserver.com/a/how-many-political-parties-are-there-in-china
Corporate Finance Institute, "What is a bell curve?" *Corporate Finance Institute,* (2020).
D. Mittal, "The bell-shaped curve: A common pattern in nature…," *Medium,* (2019).
D. Parvanova, "The industrial revolution was the force behind the New Imperialism," *ESSAI* 15, (2017).
D. Quer, E. Claver, and L. Rienda, "International expansion of Chinese multinationals: The new challenge of globalization," *Nova Science Publishers, Inc.,* (2009).
D. Russell, "Bell curve and normal distribution definition," *Thoughtco,* (2019).
D.A. Ralston, "The cross-vergence perspective: Reflections and projections," *Journal of International Business Studies* 39, no. 1 (2008): 27-40.
Dictionary, "Bell curve," *Dictionary,* 2022, https://www.dictionary.com/browse/bell-curve.
Differencebetween, "Difference between deviation and standard deviation," *Differencebetween,* 2022, https://www.differencebetween.com/difference-between-deviation-and-vs-standard-deviation/.
E. Blakemore, "What is colonialism?" *Nationalgeographic,* (2019).
E. Hong and L. Sun, "Dynamics of internationalization and outward investment: Chinese corporations´ strategies," *The China Quarterly* 187, (2006): 610-634.
E. Yurdagul, "Rogers' diffusion of innovation: Online games' diffusion of innovation of Japanese Gen Y consumers," *Economics, Humanities, Environmental and Social Sciences Conference organized by the Choice Group of the International Research Conference and The International Association of Academicians and Researchers (INAAR),* (2012).
E. Yurdagul, "Multinational conglomerates of the Korean economic miracle on the Han River in the European Union: The case of the South Korean chaebŏls in Germany" (PhD's dissertation, Johann-Wolfgang-Goethe University Frankfurt am Main, 2015).
E. Yurdagul, *International human resource management: The South Korean human resource management from the past to the present into the future,* (Ahmedabad, Sara Publication, 2019).
E. Yurdagul, *India: The inward and outward foreign direct investment,* (Empyreal Publishing House, 2020).
E. Yurdagul, "Towards multidimensional Sino-Turkish relations from the pre-modern era to the present," *WILAYAH: International Journal of East Asian Studies* 11, no. 1 (2022): 112-130.
E. Yurdagul, "A new perspective on the colonized Korea: Japanese modern colonialism and American neo-colonialism," Forthcoming.
Economicsonline, "Foreign direct investment," *Economicsonline,* 2022, https://www.economicsonline.co.uk/Global_economics/Foreign_Direct_Investment.html.

Encyclopedia, "Collective behavior," Encyclopedia, 2022, https://www.encyclopedia.comsocial-sciences-and-laweconomics-business-and-laboreconomics-terms-and-conceptscoll
Encyclopedia, "Diffusion theory," Encyclopedia, 2022, https://www.encyclopedia.com/education/encyclopedias-almanacs-transcripts-and-maps/diffusion-theory
E.M. Rogers, *Diffusion of Innovations*, (New York, Simon & Schuster, Inc., 2003).
Etymonline, "Diffusion," *Etymonline*, 2022, https://www.etymonline.com/word/diffusion
F.B. Adegboye, R. Osabohien, F.O. Olokoyo, O. Matthew, and O. Adediran, "Institutional quality, foreign direct investment, and economic development in sub-Saharan Africa," *Humanities and Social Sciences Communications* 7, no. 38 (2020).
F.H. Allport, *Social psychology*, (Houghton Mifflin, 1924).
F.S. Chapin, *Cultural change*, (Century Company, 1928).
FRBSF, "Corporate treasury bonds interest rates risk spreads," *FRBSF*, 2004, https://www.frbsf.org/education/publications/doctor-econ/2004/january/corporate-treasury-bonds-interest-rates-risk-spreads/
G. Tarde, *The laws of imitation*, trans. E.C. Parsons (New York, Holt, 1903).
Green-BRI, "Countries of the Belt and Road initiative (BRI)," *Green-BRI, 2022*, https://green-bri.org/countries-of-the-belt-and-road-initiative-bri/
H. Loewendahl, "Innovations in foreign direct investment attraction," *Inter-American Development Bank*, (2018).
H.G. Broadman and Sun Xiaolun, "The distribution of foreign direct investment in China," *The World Economy* 20, no. 3 (1997).
H.Y. Zhang and D. Van Den Bulcke, "International management strategies of Chinese multinational firms," in J. Child and Y. Lu, eds., *Management issues in China in the 1990s: International enterprises*, (London, Routledge, 1996), 141-164.
I. Benzidoun "L'imboglio des inégalités," in CEPII, l'économie Mondiale 2005, eds., *Collection Repères*, (Edition La Découverte, 2004).
I. Pekarskienea and R. Susniene, "Features of foreign direct investment in the context of globalization," *Procedia-Social and Behavioral Sciences* 213, (2015): 204-210.
I. Weber, "Origins of China's contested relation with neoliberalism: Economics, the World Bank, and Milton Friedman at the Dawn of Reform," *Global Perspectives* 1, no. 1 (2020).
International Monetary Fund, "World economic outlook," *International Monetary Fund*, (2010).
International Monetary Fund, "Consolidated spillover report: Implications from the analysis of the systemic-5," *International Monetary Fund*, (2011).
J. Grittersová, "Borrowing credibility: Global banks and monetary regimes," *University of Michigan Press*, (2017).
J. Knoerich, "How does outward foreign direct investment contribute to economic development in less advanced home countries?" *Oxford Development Studies* 45, no. 4 (2017): 443-459.
J. Manyika, S. Lund, J. Bughin, J. Woetzel, K. Stamenov, and D. Dhingra, "Digital globalization: The new era of global flows," *McKinsey & Company*, (2016).
J. Oertel, "How COVID-19 and the war in Ukraine could change EU-Taiwan relations," *Brookingsedublog*, (2022).
J. Robinson and D. Acemoğlu, "The economic impact of colonialism," *Cepr*, (2017).
J. Saarinen and R. van der Have, "Convergence in innovation," *Palgrave Macmillan*, (2009).
J. Williams and X. Zhang, "Explorations of inward foreign direct investment: U.S. and China comparative analysis," *Journal of Finance and Accountancy* 19, (2015).
James Chen, "Risk: What it means in investing, how to measure and manage it," *Investopedia*, September 20 2022, https://www.investopedia.com/terms/r/risk.asp

Jing Fanga, A. Collins, and Shujie Yao, "On the global COVID-19 pandemic and China's FDI," *Elsevier,* (2020).
Jianxun Chen, Wu Zhan, Zhaodi Tong, and Vikas Kumar, "The effect of inward FDI on outward FDI over time in China: A contingent and dynamic perspective," *Sciencedirect,* (2020).
John Feng, "The rise of China-How Communist Party transformed country into a superpower," *Newsweek,* (2021).
K. Dervis "Convergence, interdependence, and divergence," *International Monetary Fund,* (2012).
K. Suthar, "Convergence divergence debate within India," *Seven Sense Research Group (SSRG) and International Journal of Electrical and Electronics Engineering (IJEEE)* 4, no. 8 (2017), 12.
K.G. Cai, "Outward foreign direct investment: A novel dimension of China's integration into the regional and global economy," *The China Quarterly* 160, (1996): 856-880.
Kefei You, "What drives China's outward FDI? A regional analysis," *The Journal of Developing Areas* 51, no. 2 (2017): 239-253.
L. Pritchett, "Divergence, big time," *Journal of Economic Perspective* 11, no. 3 (1997): 03-17.
M. Behname "Foreign direct investment and economic growth: Evidence from Southern Asia," *Atlantic Review of Economics* 2, (2012).
M. Dooley and M. Hutchinson "Transmission of the U.S. subprime crisis to emerging markets: Evidence on the decoupling-recoupling hypothesis," *JIMF/Warwick Conference,* (2009).
M. Kwet, "Digital-colonialism: The evolution of US empire," *Longreads.tni,* (2021).
M. Stephenson and J.R. Perea, "Outward foreign direct investment: A new channel for development," *World Bank,* (2018).
M.A. Kose and E.S. Prasad, *Emerging Markets: Resilience and Growth amid Global Turmoil,* (Brookings Institution Press, 2010).
M.X. Chen and C. Lin "Foreign investment across the Belt and Road patterns, determinants and effects," *World Bank Group,* (2018).
Mathisfun, "Standard normal distribution table," *Mathisfun,* (2015).
Mathisfun, "Finding maxima and minima using derivatives," *Mathisfun,* (2017a).
Mathisfun, "Normal distribution," *Mathisfun,* (2017b).
N. Couldry and U. Mejias "Data colonialism: Rethinking big data's relation to the contemporary subject," *Television and New Media*, (2018).
N.F. Wahiba, "Convergence and divergence among countries," *Asian Economic and Financial Review* 5, no. 3 (2015): 510-520.
Newworldencyclopedia, "Neocolonialism," *Newworldencyclopedia,* 2022, https://www.newworldencyclopedia.org/entry/Neocolonialism
Organization for Economic Co-operation and Development (OECD), "FDI flows," *OECD,* 2022, https://data.oecd.org/fdi/fdi-flows.htm.
Office of Historian, "The collapse of the Soviet Union," *History-State,* 2022, https://history.state.gov/milestones/1989-1992/collapse-soviet-union.
Office of Historian, "Milestones: 1945-1952," *History-State,* 2022, httpshistory.state.govmilestones1945-1952asia-and-africa.
P. David and W. Crawley, *Satellites over South Asia, broadcasting culture and the public interest,* (New Delhi: Sage Publications, 2001), 21.
P. Hertenstein, D. Sutherland, and J. Anderson, "Internationalization within networks: Exploring the relationship between inward and outward FDI in Chinas auto components industry," *Asia Pacific Journal of Management* 34, no. 1 (2017): 69-96.
P.J. Buckley, L.J. Clegg, A.R. Cross, Xin Liu, H. Voss, and Ping Zheng, "The determinants of Chinese outward foreign direct investment," *Journal of International Business Studies* 38, no. 4 (2007): 499-518.

R.H. Webber, "Convergence or divergence," *Columbia Journal of World Business* 4, no. 3 (1969): 75-83.
R. Morck, B. Yeung, and M. Zhao, "Perspectives on China's outward foreign direct investment," *Journal of International Business Studies* 39, no. 3 (2008): 337-350.
R.M. Saada, A.H.M. Noora, and A.H.S. Md Nor, "Developing countries' outward investment: Push factors for Malaysia," *Procedia-Social and Behavioral Sciences* 130, (2014): 237-246.
Reserve Bank of Australia, "The global financial crisis," *Reserve Bank of Australia*, (2021).
S. Glen, "Normal distributions (bell curve): Definition, word problems," *Statisticshowto*, (2021).
S. Hašková, Weisen Li, and E.W. Osborne, "Economic convergence of Czech regions in terms of GDP and unemployment rate in response to FDI flows: Do businesses and regions flourish?" *Journal of interdisciplinary research* 9, no. 1 (2019).
S. Poncet, "Inward and outward FDI in China," *CNRS and CEPII*, (2007).
S. Zhang, "Columbia FDI perspectives-The China-United States BIT negotiations: A Chinese perspective," *Vale Columbia Center on Sustainable International Investment*, (2014).
S.A. Lowery and M.L. DeFleur, *Milestones in Mass Communication research*, (New York, Longman Publishers USA, 1995).
S.A. McLeod, "What is a normal distribution in Statistics?" *Simplypsychology*, (2019a).
S.A. McLeod, "What is central limit theorem in statistics?" *Simplypsychology*, (2019b).
T.L. McPhail, *Global communication: Theories, stakeholders, and trends*, (Allyn and Bacon, 2002).
S.K. Mathur, "Absolute convergence, its speed and economic growth for selected countries for 1961-2001," *The Journal of the Korean Economy* 6, no.2 (2005): 245-273.
Santandertarde, "Foreign investment in China," *Santandertarde*, (2021).
Shujie Yao, Wang Pan, Zhang Jing, and Ou Jinghua, "Dynamic relationship between China's inward and outward foreign direct investments," *China Economic Review* 40, (2016): 54-70.
Siu-ling Wu and Chien-hsun Chen, "An assessment of outward foreign direct investment from China's transitional economy," *Europe-Asia Studies* 53, no. 8 (2001): 1235-1254.
T. Elkjaer and J. Damgaard "How digitalization and globalization have remapped the global FDI network," *OECD*, (2018).
T. Getz, "Industrial imperialism, the "new" imperialism," *Khanacademy*, (2021).
T. Moran, H. Görg, A. Serič and C. Krieger-Boden, "How to attract quality FDI?" *G20 Insights*, (2017).
T.W. Valente and E.M. Rogers, "The origins and development of the diffusion of innovations paradigm as an example of scientific growth," *Science Communication* 16, no. 3 (1995): 242-273.
Tatsuyuki Ota, "The role of special economic zones in China's economic development as compared with Asian Export Processing Zones: 1979-1995," *Researchgate*, (2003).
Themathpage, "Maximum and minimum values," *Themathpage*, (2020).
The United States Food and Drug Administration (FDA), "Bell curve," *FDA*, 2022, https://www.fda.gov.
Thefreedictionary, "Deviation," *Thefreedictionary*, 2022, https://www.thefreedictionary.com/deviation
Thefreedictionary, "Standard deviation," *Thefreedictionary*, 2022, https://www.thefreedictionary.com/standard+deviation
The official website of Sino government, "Countries of the Belt and Road initiative (BRI)," *Yidaiyilu*, 2022, https://www.yidaiyilu.gov.cn
Twailr, "Digital colonialism and the world trade organization," *Twailer*, 2022, https://twailr.com/digital-colonialism-and-the-world-trade-organization/

U. Ali, W. Shan, Jian-jun Wang, and A. Amin, 'Outward foreign direct investment and economic growth in China: Evidence from asymmetric Ardl approach,' *Journal of Business Economics and Management* 19, no. 5 (2018): 706-721.
United Nations (NU), "Data economy," *NU*, 2022, https://www.un.org/development/desa/en/news/policy/data-economy.html.
United Nations Conference on Trade and Development, "World investment report," *United Nations Conference on Trade and Development*, (1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022).
United Nations Economic and Social Commission for Asia and the Pacific, "Promoting inward and outward foreign direct investment in the post-coronavirus-disease era," *United Nations Economic and Social Council*, (2020).
United Nations Conference on Trade and Development, "World investment report," *United Nations Conference on Trade and Development*, (2022).
USCC, "China's position in Russia's invasion of Ukraine," *USCC*, 2022, https://www.uscc.gov/research/chinas-position-russias-invasion-ukraine.
USCC, "China-Russia interactions leading up to the invasion of Ukraine," *USCC*, 2022, https://www.uscc.gov/research/china-russia-interactions-leading-invasion-ukraine.
V.I. Lenin, "Imperialism, the highest stage of capitalism," *Switzerland: ISN*, (1917).
Quanlin, Li, Sun-hae Lee, and Sae-woon Park, "The effect of inward and outward foreign direct investment on regional innovation performance: Evidence from China," *Global Business & Finance Review (GBFR) & People & Global Business Association (P&GBA)* 25, no. 1 (2020): 65-88.
W.A. Hemmerich, "Normal distribution," *Matheguru*, (2019).
W.W. LaMorte, "Behavioral change models," *Boston University School of Public Health*, (2019).
Wanda Tseng and H. Zebregs, "Foreign direct investment in China: Some lessons for other countries," *International Monetary Fund*, (2003).
Worldbank, "What is the difference between foreign direct investment (FDI) net inflows and net outflows?" *Worldbank*, 2022,
https://datahelpdesk.worldbank.org/knowledgebase/articles/114954-what-is-the-difference-between-foreign-direct-inve
Xingyuan Feng, Weisen Li, and E.W. Osborne, "Classical liberalism in China: Some history and prospects," *Econ Journal Watch* 14, no. 2 (2017): 218-240.
Xuetong Yan, "Chinese values vs. liberalism: What ideology will shape the international normative order?" *The Chinese Journal of International Politics*, (2018): 01-22.
Y. Chu and A.Y. So, "State neoliberalism: The Chinese Road to capitalism," in Y., Chu, eds., *Chinese Capitalisms*, (London, Palgrave Macmillan, 2010).
Yin-Wong Cheung and Xingwang Qian "Empirics of China's outward direct investment," *Pacific Economic Review* 14, no. 3 (2009): 312-341.