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CONTENTS OF THE ISSUE

- i. Copyright Notice
- ii. Editorial Board Members
- iii. Chief Author and Dean
- iv. Contents of the Issue

1. Beyond Borders: Rethinking National Sovereignty and Comparative Advantage in the Wake of COVID-19. *1-24*
2. Impact of Good Governance on Financial Inclusion in India: Evidence from the ARDL Bounds Testing Approach. *25-38*
3. Fifty Years of Italian Personal Income Tax. *39-50*
4. Integrating AI in E-Business Processes: Evaluating its Impact and Trending Future Direction on Contemporary Trade. *51-63*
5. Macroeconomic Factors and Stock Market Return in Nepal. *65-66*

- v. Fellows
- vi. Auxiliary Memberships
- vii. Preferred Author Guidelines
- viii. Index



Beyond Borders: Rethinking National Sovereignty and Comparative Advantage in the Wake of COVID-19

By Kone Salif

Senior Lecturer University of Félix Houphouët-Boigny

Introduction- Does national sovereignty call into question the principle of comparative advantage? This is the question we are entitled to ask ourselves in light of the statements and decisions made to end the coronavirus (COVID-19) pandemic. If we refer to the statements made by French President Emmanuel Macron on 12 March 2020, Angela Merkel on 11 March 2020, and Donald Trump, the President of the United States, the conclusion is clear. In the face of the coronavirus (COVID-19) pandemic, the disruption of supply chains that is threatening, among other things, the availability of gels and protective masks in European countries, the United States and even the rest of the world, means that the development model based solely on the law of markets must be called into question. For the French President, for example, and I quote, "To delegate our food, our protection, our ability to care for our living environment to others is madness". According to them, the consequences of the pandemic prove that it is not always best to follow market forces, even when it comes to international trade.

In so doing, the fight against the coronavirus pandemic brings back into fashion the theory of the supremacy of national sovereignty over free trade, or at least the application of the principle of comparative advantage, for certain goods, at least in certain situations.

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Beyond Borders: Rethinking National Sovereignty and Comparative Advantage in the Wake of COVID-19

Kone Salif

I. INTRODUCTION

Does national sovereignty call into question the principle of comparative advantage? This is the question we are entitled to ask ourselves in light of the statements and decisions made to end the coronavirus (COVID-19) pandemic. If we refer to the statements made by French President Emmanuel Macron on 12 March 2020, Angela Merkel on 11 March 2020, and Donald Trump, the President of the United States, the conclusion is clear. In the face of the coronavirus (COVID-19) pandemic, the disruption of supply chains that is threatening, among other things, the availability of gels and protective masks in European countries, the United States and even the rest of the world, means that the development model based solely on the law of markets must be called into question. For the French President, for example, and I quote, "To delegate our food, our protection, our ability to care for our living environment to others is madness". According to them, the consequences of the pandemic prove that it is not always best to follow market forces, even when it comes to international trade.

In so doing, the fight against the coronavirus pandemic brings back into fashion the theory of the supremacy of national sovereignty over free trade, or at least the application of the principle of comparative advantage, for certain goods, at least in certain situations. Whether it be the protectionist arguments of industrial infancy, the arguments of industrial senescence, the arguments of strategic goods, the arguments of strategic trade policy, etc., they all have as their backdrop the theory of the supremacy of national sovereignty over the principle of comparative advantage.

The conceptual consequence of such a vision of the role of states is to give weight to so-called mercantilist theorists¹. At a domestic level, mercantilist theory translates into state intervention through various measures to encourage and regulate domestic trade. In the case of the coronavirus, this intervention will be in favour of boosting production and employment. As far

as international trade is concerned, the mercantilists' defence of state interventionism leads to a vision of conflict. For them, it is preferable to be the strongest in their commercial relationships; otherwise, it would be better to refrain from participating for their own well-being and sometimes for the well-being of everyone (the world). The implication of such an approach is the possibility of widespread wars as long as the balance of power appears to be the best means of gaining advantage in international relations, whether commercial or otherwise.

In short, the speeches of the world's foremost leaders sound like a call for protectionism. While protectionism can be understood in the strict sense as a state's decision to directly restrict its trade with the rest of the world, in a broader sense it can be seen as any intervention by a state in its trade with the rest of the world. Anything that challenges the principle of free trade on a global scale, a return to mercantilism, at least in a modern form. This gives people the image of a ship that, because it is rocking, must be harpooned. Indeed, although based on legitimate concerns, these speeches come at a time when there has been a decade of protectionist practices, as can be seen from the content and title of the article by Cassagnard and Gouaux (2013) in *Alternatives Economiques* entitled "l'alerte protectionniste". As can also be seen from the many reactions and statements made by Trump as soon as he was elected President of the United States.

We aim to show that national sovereignty is a conflict-generating concept that has become dangerous for world equilibrium. We demonstrate this in two stages. Firstly, we show that the protectionist temptations of the developed countries of Europe and the United States towards China can be linked to China's rise as a significant trading power. Secondly, we show that the concept of national sovereignty is discriminatory and conflict-producing without being superior to the principle of comparative advantage. It is therefore clear that this paper defends the principle of free trade, but from a normative perspective.

Our paper is organised into four parts. The first presents a brief review of the literature on protectionist theories. The second part presents the reasons for the rising tensions in world trade. The third part presents the negative consequences of the concept of national

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sovereignty. Finally, the fourth part, which serves as a conclusion, aims to sketch out global sovereignty as a solution to concerns that are new only in their forms.

II. FROM MERCANTILISM TO PROTECTIONISM. A BRIEF REVIEW OF THE LITERATURE

In the beginning, it was mercantilism. Although for some economic historians, mercantilism cannot be considered a structured current of economic thought in the modern sense of the term, its philosophy can nevertheless be summarised as follows. A state can only develop its wealth by increasing its quantity of precious metals. It can only do this by developing its industries and domestic trade (which must be liberalised) and by having a positive trade balance. To achieve this, it must favour exports over imports and have its sources of precious metals. But all this can only be achieved if its army is powerful and its goal is to strengthen its military capacity. In other words, it is the concept of military power that lies behind the zero-sum or even negative-sum game theory developed by mercantilists, given that global resources of precious metals are assumed to be limited. For example, Hauser (1931) writes, according to Jean Bodin: 1) that "We must develop, among national products, those that allow us to do without foreign goods" and goes on to add 2) "essential products are export products, because they bring foreign gold into our country". Although there is a certain contradiction in his thinking between his defence of export development and the imposition of export duties on certain products such as wheat and any product that could enable other countries to accumulate wealth (Hauser; 1931), Jean Bodin advocates a positive trade balance. Just like this quote about international trade attributed to Bodin by the website "Introduction à l'analyse économique"² "No one wins unless someone else loses".

With Antoine de Montchrétien in his treatise on political economy published in (1615)³, we note that trade between States can only be the prerogative of the strong. In fact, according to him (Livre Deuxième, pages 180, 181 and 182), in response to the question of whether France produces everything it needs that will become trade between people, he concludes his answer with the following. "I conclude only, with the stoics, that virtue is happy, and that it is the property of no one, and that furthermore, that there are no men sufficient in matters of State, that the Kingdom which can itself provide for its necessities is always richer, stronger and more formidable". He goes on to add (Book Two, p 141): "It can now be said that we do not live so much by trading in the elements as by gold and silver; these are two great and faithful friends. This also suggests that international trade is only helpful if it allows the participating country to accumulate gold and silver, thereby achieving a positive trade balance. Anything that

should benefit the country's military power while serving as a foundation for its commercial development.

Thomas Mun's analyses are no exception to the rule. Although it needs to be qualified⁴, Thomas Mun's vision makes a unique link between the need for a country to have a positive balance of trade and national prosperity, while at the same time encouraging and developing domestic trade. Finally, this mercantilist vision, which makes international trade a proactive tool in favour of a given people, a defined territory, is also present in William Petty's work, as the following quotation attests. Referring to his work "Arithmétique Politique", Petty writes in his introduction, "The sole aim of this treatise is the enrichment of a kingdom by the development of trade and public credit."⁵

To sum up and keep things simple, let us borrow from Simone (1969) the following formula to describe the mercantilist vision. For the mercantilists, "economics became politics (including war and diplomacy) continued by other means". It was this "go to war" vision that was challenged by the classical authors, starting with Adam Smith (1776) in *The Causes of the Wealth of Nations* and then by David Ricardo (1817) through the principle of comparative advantage. Their concept is that every country benefits from participating freely in international trade according to its capabilities, even if it has no technological advantage or even whatever its endowment in productive resources, as reinforced by the neoclassicists Hecksher (1919), Ohlin (1933) and Samuelson (1948 and 1949).

Then came protectionism. Although protectionism in the sense of the customs and non-customs tools developed to protect national producers and access to the national market developed even before mercantilism, we are talking about its theorisation and defining it in a broad sense. From this point of view, modern forms of protectionism are much more subtle, less warlike and more diverse. At the beginning of this theorisation, there was List's educational protectionism or protectionism of childhood industries (1841). According to List, it was only necessary to question the free trade of the classics when a country did not yet have sufficiently developed and competitive industries to face up to international competition. This theory was used extensively by developing countries to justify the introduction of various protectionist tools as part of their import-substitution development or export promotion policies.

This was followed by the theory of optimal tariffs with Bickerdike (1906). In this theory, Bickerdike defended the concept that a country could improve its terms of trade by imposing a customs duty on its imports. In particular following Bouët (2000), "while it has long been established that in a competitive framework the effects of a customs duty are negative overall when the country imposing the duty is small, when that country is sufficiently large, on the other hand, the restrictive

effect of a tariff on national demand and therefore on world demand leads to a fall in the world price of that good and an improvement in the terms of trade for that country".

There was also the theory of senescent industries developed by Kaldor (1971). It is at the other end of the spectrum of industrial life. According to Kaldor, old industries, because they can no longer face up to competition because they have been overtaken by technological innovations, see their profits fall, leading to their closure and the capture of their domestic market share by a foreign company, which also leads to unemployment among nationals. All of which can be a source of imbalance in a country's economy, as was the case in Great Britain in the 1970s. In order to allow either a senescent national company to innovate thanks to the technical progress that can save it or another national company to conquer the share of the national market of the ageing industry, protection can be granted to them in order to slow down the fall in profit and protect domestic employment. Protectionist measures can take various forms.

There has also been the theory of strategic activities or national defence⁶. This defends the concept that certain specific products linked to a country's defence should be excluded from trade liberalisation because of their strategic nature. Similarly, for certain products such as energy products (oil, for example) or high-tech products (computers, for example), the introduction of protectionist measures helps to ensure the country's independence from the rest of the world. Food independence is one way of achieving food security, for example, according to this vision of international trade.

With the recognition of the imperfection of competition by authors such as Krugman (1979), the theory of strategic trade policies was developed by Brander and Spencer (1985). The concept is that world markets operate in a situation of oligopolistic competition, so there are strategic interactions between domestic firms and firms from the rest of the world on the markets. In this framework, the domestic authority of a country can help its domestic firms to capture a higher rent than that which the market would 'naturally' offer, provided that the authorities of other countries do not react.

Finally, there is the theory of unfair competition developed by Culbertson (1986) and Samuelson (2004). According to this theory, free trade has adverse effects from a variety of sources: unfair competition, wage competition and the breakdown between domestic supply and demand, particularly in the United States. As a result, it is only natural that countries, the United States in particular, should adopt protectionist measures to defend their companies from this unfair competition. Such protection can take the form of customs duties, such as the law passed in 2010 by the United States

increasing customs duties on goods from countries whose currencies were deemed to be undervalued. Alongside these widely recognised and well-known theories, there are also those of the heterodox theories: the unequal trade of Arghiri Emmanuel (1970), the concentration of exports and dependence on the world market, the continually unfavourable terms of trade of Furtado, Prebisch and Amin, and so on. But there is also the theory of the positive link between protectionism and growth rates on a historical basis by Paul Bairoch (1976).

In short, and beyond their diversity, these different theories have been developed to justify the adoption of protectionist tools. These tools are very varied (ranging from customs tariffs to decoupling, non-tariff tools, monetary and exchange rate tools, etc.) in specific situations. However, it is essential to distinguish between two types of protectionism. Protectionism as an offensive measure of domination and protectionism as a defensive measure of survival because free trade is not a reality. While the former, like the mercantilists, advise using international trade as a tool for development at the expense of other countries, the latter does not. Indeed, among the defenders of the latter are authors such as Third World activists and advocates of fair trade, for whom international economic relations are, in fact, a relationship of domination. This leads these authors to question the validity of free trade, suggesting that protectionism is a better option and advises defensive measures. But whether they are offensive or defensive, the foundation and justification of all these protective measures rests on the concept of national sovereignty.

Hence, the need to question this concept, particularly its relevance in today's world. Indeed, the fundamental question today is whether it is economically optimal to strengthen nation-states or to make them merge into the worldwide village-nation that the world has become through progress and innovation or whether there is an intermediate response in political and institutional coordination on a global scale. The answer to this question is not straightforward. It will be addressed in the next section. But before seeking to answer it, let us explore the nature of trade power relations before the emergence of COVID-19.

III. CORONAVIRUS PANDEMIC, A PRETEXT FOR PROTECTIONIST TENSIONS OVER CHINA'S GROWING COMMERCIAL POWER

The coronavirus pandemic poses three significant challenges to the world's economies. Firstly, the challenge of care in terms of costs and organisation to avoid as many deaths and disorganisation as possible. Secondly, there is the challenge of revitalising economies in order to mitigate the negative consequences for production, consumption, employment and wealth creation as quickly as possible. Thirdly,

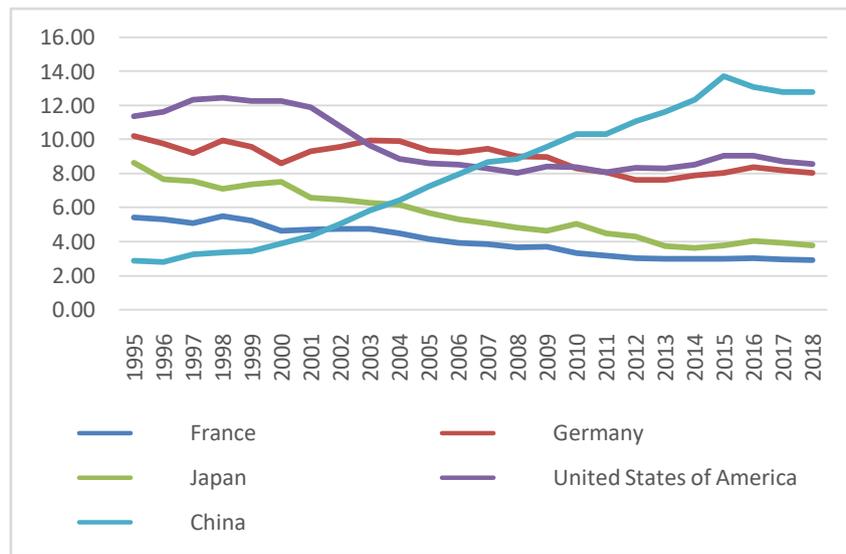
the challenge is that of the neoclassical paradigm, i.e. analysing its capacity to provide solutions to these crises. As part of this third challenge, it is essential to understand the sources of the return to protectionism. Thus, an analysis of the evolution of China's trade power and its causes is needed in order to better judge the relevance of studies of international trade based on the neoclassical paradigm in light of the speeches of the prominent political leaders of the developed world.

a) *The Rise of China's Commercial Power, a Source of New Protectionism*

The first question to be asked is why, resort to national sovereignty today? We propose two answers to this question. The first is that the individual and global economic situation today resembles that of economies in a state of war with the coronavirus (COVID-19). Policies to combat the coronavirus pandemic, unfortunately involve measures that can disrupt production and supply chains: suspension of inter-country flights, strict control of travel within countries and internationally, closure of schools, universities and several centres of activity for the production of both services and goods (strict confinement to industrial zones).

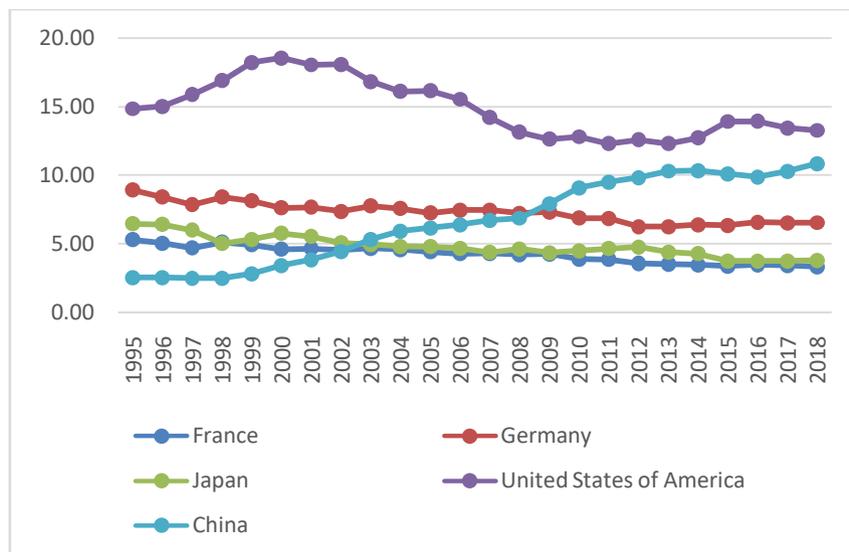
These measures are practical today to combat the spread of the coronavirus. However, and this is the second answer to the question posed, we must fear their protectionist ulterior motive. This fear is not unfounded, given the evolution of the various major

countries in international trade. Indeed, before the outbreak of the coronavirus, the global economy functioned with China as the world's factory, producing almost everything for everyone in a system of global value chains. But above all, the situation before the coronavirus confirmed China's position as the challenger to the United States of America as the world's leading trading economy. From accounting for around 2.91% of world exports and 2.55% of world imports in 1995, China accounted for around 12.81% of world exports and 10.86% of world imports in 2018. To grasp the significance of this development, we need to compare it with that of other countries such as the United States, Japan and France. In 1995, the United States accounted for 11.38% of world exports, Germany 10.23%, Japan 8.65%, and France 5.43%. In 2018, these countries accounted for 8.58%, 8.05%, 3.80% and 2.93% of world exports, respectively. Similarly, in terms of world imports, the United States of America accounted for 14.86% in 1995, compared with 13.28% in 2018. Germany 8.95% in 1995 compared with 6.57% in 2018. Japan was 6.48% in 1995 compared with 3.80% in 2018. France was 5.31% in 1995 compared with 3.35% in 2018. Of these five leading countries, only China's weight is increasing over time, and its dominance (in terms of relative proportion) of international trade is being reversed in its favour. The significance of these trends is shown in Figures 1 and 2 below.



Sources: UNCTAD data and author's calculations

Figure 1: Trends in the Share of China, the United States, Japan, Germany and France in World Exports Over the Period 1995-2018



Sources: UNCTAD data and author's calculations

Figure 2: Trends in the share of China, the United States, Japan, Germany and France in world imports over the period 1995-2018

An analysis of the products exported and imported by China shows its gradual and unquestionable domination of world trade. This domination applies whether we categorise products according to their nature or according to the level of technology required to produce them.

From the perspective of the nature of the products, two significant observations can be made. Firstly, China is becoming an increasingly industrialised country, exporting more high-value-added products than it imports. Indeed, the importance of the "Machinery and transport equipment", "Manufactured articles", and "Miscellaneous manufactured articles" items is higher in China's total exports in 2018 than in 1995. These three items accounted for only 79.15% of China's total exports in 1995, and 88.30% in 2018. At the same time, the items 'Chemicals and related products', 'Machinery and transport equipment' and 'Manufactured articles', although dominating China's imports, represent a smaller and smaller proportion of imports. In 1995, these three items together accounted for 74.18% of China's total imports, compared with 54.67% in 2018.

Secondly, China is gradually becoming the major player in international trade in high-value-added products in terms of proportion. China's share of exports and imports of these strategic products has risen sharply, often outstripping that of the USA. For example, China's weighting in world exports of machinery and transport equipment, manufactured goods and miscellaneous manufactured goods. Specifically, in 1995, China's total weight for these three items was 14.06% of world exports, compared with 61.31% in 2018. Similarly, China's share of world imports has also risen, from 9.54% in 1995 to 27.42% in 2018. Figures 3 and 4 illustrate China's gradual dominance in terms of the proportion of product categories.

An analysis of exports and imports of products by manufacturing technology (Lall classification) confirms China's gradual and definite domination of strategic and high-value-added products. Indeed, an analysis of export statistics shows that Chinese exports have caught up with and even surpassed those of the USA, Germany and Japan, for example, in the following technology-based product categories: Manufactured articles from natural resources (agri-food), Low-technology manufactured articles (textiles, clothing and footwear processes)⁷, Medium-technology manufactured articles (processes and engineering), High-technology manufactured and semi-finished articles (electronics and electrical). In addition, analysis of its import statistics shows China's dominance over the world's leading trading economies such as the USA, Germany and Japan in the following technology product categories: primary products, other manufactured goods of natural origin (these two categories are mainly made up of raw materials), medium-technology manufactured goods (processes), high-technology manufactured and semi-finished goods (electronic and electrical), other high-technology manufactured goods (such as optical apparatus and equipment, measuring and control apparatus and equipment, etc.). The last three categories of products are also inputs, to which a final category must be added, containing non-monetary gold, printed matter, non-legal tender, works of art and antiques, etc.

IV. CHINA'S GRADUAL DOMINATION IN TECHNOLOGICAL INNOVATION, A SOURCE OF REVERSAL OF COMPARATIVE ADVANTAGE

These changes in global trade statistics actually reflect a reversal of comparative advantages in favour of China. This reversal of comparative advantages is closely linked to innovation and technical progress, as highlighted by theorists of the technology gap such as Vernon (1966) and Posner (1961). China has become the leading player in the filing of patent applications in 2019⁸. The issue raised by China's advantage in this area is closely linked to the method of producing patents, trademarks and industrial designs, i.e. the issue of intellectual property rights protection. Indeed, China's financing methods and mechanisms for acquiring innovations are subject to criticism. Public subsidies and industrial espionage are at the heart of this debate. It should be noted that innovation and technical progress have a direct impact on the nature of international competition, a point made by proponents of the theory of unfair Chinese competition (Culbertson; 1986, Samuelson; 2004). Be that as it may, these developments (in terms of innovation and technical progress) testify to the transformation of China's economy from a simple manufacturing plant for the world to a design centre for the world. Before the outbreak of the coronavirus, therefore, the international trade situation was one of strong protectionist temptations against a backdrop of theoretical debates about the merits or otherwise and the ethics of this inversion.

In short, before the coronavirus, there were strong tensions in international trade relations between its leading players. This is where the concept of national sovereignty comes into play through a nationalist mobilisation of policies to combat coronavirus and boost national economies. In other words, what world leaders are challenging through their calls for national sovereignty is the international division of labour that has been working against them since long before the advent of the coronavirus pandemic. Yet the foundation of this international division of labour is the principle of comparative advantage.

V. THE CONCEPT OF NATIONAL SOVEREIGNTY AS THE BASIS FOR PROTECTIONIST, CONFLICT-GENERATING AND SUB-OPTIMAL TRADE POLICIES

The challenge of the coherence of the neoclassical paradigm also arises through the relevance of the concepts of national sovereignty and comparative advantage in the context of globalisation. Following Bourque (2002), if globalisation is the process of integration leading to the disappearance of the geo-

political role of nation-state borders, then two main questions arise. Firstly, why the persistence of protectionist measures in international trade? Secondly, in terms of global welfare, which of national sovereignty and comparative advantage is better?

a) *National Sovereignty, a Conflict-Ridden Concept Underpinning Trade Policies*

As we said earlier, the concept of sovereignty is the very foundation of any protectionist trade policy. But it is based on a conflict because it is discriminatory. The concept of sovereignty, however complex and thoughtful it may be, rests first and foremost on a principle of discrimination. There are three main assertions here, which we shall endeavour to demonstrate: 1) the complexity of the concept of sovereignty, 2) sovereignty as a principle of discrimination and conflict, and 3) sovereignty as a principle on which protectionist trade policies are based.

Sovereignty is a complex concept, and even more so in its links with the economic sphere, particularly international economic relations. This complexity is highlighted by Jacques Sapir (2019)⁹ to oppose its disappearance from international relations. From its initial definition by Jean Bodin, who made sovereignty "*the absolute and perpetual power of a republic*" (Piérard; 2007), raising the question of its uniqueness and indivisibility, Commons distinguished three types: 1) the sovereignty of states based on the monopoly of legal violence, 2) the sovereignty of companies, which is based on the power of owners, and 3) the sovereignty of religious and moral institutions, which translates into the power of opinion¹⁰. But Pesqueux (2010) distinguishes four other acceptations or types in addition to that of nation-states: "*two economic, one political and one that is both political and territorial in the geographical sense of the term*". Sovereignty even becomes subsidiary with local currencies Guyomart (2013). In short, the concept of sovereignty is being applied in many different ways today. This complexity of the concept of sovereignty certainly reflects the vicissitudes of the evolution of the fight for democracy and human rights, but above all, it reflects the vagueness with which it is used. Founded by political theorists to legitimise political power based on the right of all to freedom, particularly that of the people based on a common identity with an applicable principle, the concept of sovereignty has been regularly used by thinkers of every century to legitimise or defend the social, economic and political modes of interaction of their time. As a result, sovereignty has come to be accepted in ever greater numbers, as shown in Sapir (2019) and Pesqueux (2010). Some acceptances go so far as to confuse it with that of transparency. In other words, national sovereignty is a concept that is used today to justify the current developments in our modern societies: globalisation, financialisation, climate change

and access to natural resources (water, rare minerals, oil, etc.). National sovereignty has thus become globalised governance, societal responsibility, traceability, standardisation, and so on.

Sovereignty, whatever its acceptance or type, is based above all on a principle of exclusion, a principle of discrimination: discrimination between peoples of the world, discrimination between places on the world, discrimination between the rights of peoples on the world and therefore discrimination between modes of political management on the world. Indeed, in its purest definition, sovereignty refers to the notion of limits, territorial limits, jurisdictional limits, political limits and therefore limits of legitimacy. Christian Saint-Étienne (2016), speaking of national sovereignty, for example, defined it as *"the capacity to be master of one's own country, to resist external attacks and internal destabilisation attempts, and to choose with whom to cooperate on a basis of mutual respect"*, which in his view presupposes *"political and military independence and the capacity to ensure the economic prosperity of its population in all circumstances"*. In so doing, sovereignty acknowledges that the legitimacy of some is not the legitimacy of others, and the rights of some are not the rights of others. So, there is discrimination at every level. Such discrimination is a source of frustration, mistrust and even distrust. It is in its collective identity-forming dimension that the concept of sovereignty is most commonly applied, particularly on the international stage. The concept of sovereignty, which should make it possible to constitute a single 'we', does so by considering different 'we's'. And that is the discrimination, a discrimination that is applied to construct "we" in "a reality (a context) of diversity and conflict"¹¹. From this point of view, sovereignty sacralises a territory, an economic, legal and settlement space. Under these conditions, the world as a whole therefore appears to be a plural society in the sense of John S. Furnivall (Farhat; 2016), since only encounters on the various markets are the places where shared values are constructed. But these are encounters between different us. From this perspective, even international institutions such as the World Trade Organisation, the United Nations, the World Health Organisation, the World Intellectual Property Organisation, etc. and regional organisations (EU¹², CUSMA¹³, ASEAN¹⁴, ZLECAf¹⁵, ECOWAS¹⁶, etc.) are merely mechanisms for coordinating sacred decisions of nation-states between different us. However, national sovereignty is a concept that gives meaning to the law within a given framework, a democratic framework. It is not a biological attribute, a natural material entity, but a way of organising and managing the city. Consequently, it can only impose itself on the demands (or aspirations) of other peoples in international relations if it is instrumentalised; in other words, if it is limited to one people in opposition to (or differentiated from) another people. In this case, it is not

surprising that the concept of sovereignty is disliked by neoclassical economists, insofar as it highlights and justifies power relations through games that are, at best, zero-sum; in a word, it is conflict-producing. In short, because sovereignty is conjugated with the national, it can only be conflict-generating because it is discriminatory.

To say that sovereignty is the very foundation of protectionist trade policies is common knowledge. This adds little or nothing to our understanding of the nature of trade policies, which is based on long-standing mercantilist principles. Indeed, it is common knowledge that sovereignty, namely the sacredness of defending the interests of a unified people behind their sovereign, justified the introduction of sometimes prohibitive customs duties and other restrictive trade policies by mercantilists such as Jean Bodin and Antoine de Montchrétien. That the German national interest and the sacredness of its defence led Friedrich List to theorise about industrial childhood is also common knowledge. Similarly, that the national defence of ageing British industries in a context of economic crisis led Nicolas Kaldor to his theorisation of the defence of senescent industries is self-evident. However, what is important are the references adopted for the analyses. The references adopted to make any cost-benefit comparisons are purely national (nation-state). These references have the disadvantage of seeking to maximise only the well-being of one people, regardless of what happens to the well-being of other people, in its most nationalistic form. As such, it consists of maximising the overall well-being of countries, given the national sovereignty of each nation (globalised governance). The problem with this is that the issues raised today by the coronavirus pandemic are typically global in nature. Strong interdependencies, particularly the rapid development of means of transport and the high degree of intermingling of populations, mean that national sovereignty can no longer prevent the spread of diseases that are potentially dangerous to humans, or even severely hamper the effectiveness of disease control policies and national economic recovery policies. The fault lies in the fact that with national sovereignty, we can only rely on solidarity, which is voluntary and non-binding for everyone. This raises questions such as the following. Who bears responsibility for the coronavirus pandemic? Who pays the bill? a complex question for developing economies.

b) *National Sovereignty: A Concept that Fails to Maximise Global Well-being*

Let's return to the purely commercial dimension of the issue. Economists have long established that restrictive trade policies (tariffs, export taxes, standards, technical barriers to trade, quotas, subsidies, etc.) have a negative impact on the welfare of the countries that apply them. What is at issue here is global well-being: should we maximise individual well-being or global well-

being? Two well-known results from international trade economists tend to support our choice of global welfare. Mundell's theorem (1957) and the gains from international trade in the presence of external economies of scale by Helpman and Krugman (1985) tend to prove that the presence of borders is sub-optimal in exploiting the advantages associated with international trade. Mundell's theorem states that in the absence of any international exchange of goods, perfect international mobility of productive factors leads to the equalisation of goods prices in all countries. In other words, in the absence of the practical manifestations of sovereignty (international immobility of the factors of production), even if trade in goods takes place within regions alone, in the long run, the level of well-being in each area of the world will converge towards the highest level and will be the same for all. As for the result established by the authors of the new theories of international trade, it can be summarised as follows: international trade does not consistently achieve the optimal allocation of resources that would exist in the absence of borders, particularly in the presence of external economies of scale. In other words, in the presence of external economies of scale, the existence of borders, which translates into the immobility of factors of production between countries, prevents the maximum exploitation of economies of scale.

These results are in line with Paul Krugman's Parable of the Samuelson Angel. In this parable, there is an initially borderless world in which productive resources are used optimally. However, an angel appears and inscribes on each unit of resource the fact that it belongs to a particular nation, thus materialising the borders. For Krugman, the application of the principle of comparative advantage aims, in effect, to recreate the initial integrated world (a world without national sovereignty). From this account, this account shows that the principle of comparative advantage is superior to the principle of national sovereignty in terms of global well-being. This result is obtained within the framework of the neoclassical paradigm with its postulate of pure and perfect competition.

One criticism of this argument is that the neoclassical paradigm has shown its limitations in situations of imperfect competition. However, the result of Helpman and Krugman (1985) shows the relevance of this approach in situations of imperfect competition. The implications of this result go beyond external economies of scale and also concern internal economies of scale within firms. It can be understood as follows. In the presence of economies of scale (internal or external) within firms, as long as world demand for a good is sufficient, the immobility of the factors of production, particularly labour, leads to their under-exploitation. Nowadays, global demand is generally sufficient and specifically sufficient for goods that protect against coronavirus, such as gels, gloves and

masks. In short, in the presence of borders, global well-being is optimised rather than maximised.

Similarly, analyses in terms of border effects prove that the mere existence of borders makes the price of goods and services diverge between domestic and foreign markets (McCallum, 1995; Disdier, 2005; Crozet and Trionfetti, 2002; Head and Mayer, 2002; Disdier and Mucchelli, 2001; Helliwell and Schembri, 2005; Diaz et al., 1996; Cereg-Larea-Faseg, 2018). There has been renewed interest in the influence of national borders on trade since the seminal contribution of McCallum (1995). The concept is that despite the intensification of international trade in goods and capital associated with globalisation, and despite the strong growth of trade liberalisation processes at both regional and multilateral levels, intra-country trade between two areas is still greater than international trade between two regions of the same size and distance apart.

In the case of the health crisis faced by the world with the coronavirus pandemic, another dimension of border effects has emerged. The difficulties in supplying masks, gels and protective gloves, and even in producing medicines for healthcare, are another consequence of national sovereignty, confirming that borders have not disappeared. National sovereignty has prevented the free movement of capital, labour and skills. All of which has made China's production of these goods insufficient. Anything that has caused human harm while promoting the exploitation and sale of these products by China (international solidarity is being exploited). So, before Samuelson's angel arrived, not only would capital, labour and skills have migrated to China and its factories producing these goods¹⁷, but China would also have used them indiscriminately, regardless of whether they belonged to it or not.

VI. CONCLUSION: NATIONAL SOVEREIGNTY, A CONCEPT TO BE TRANSCENDED

One of the lessons to be learned from the global health crisis caused by the coronavirus is not the failure of markets per se but the failure of market institutions and regulation. Markets can no longer be designed specifically for national or regional purposes, otherwise the advances of globalisation and the globalisation of production can only pose a threat to the well-being of the populations of countries around the world, both individually and globally.

Is it not also the duty of the French President, the duty of the German Chancellor, the duty of the American President, the duty of the British Prime Minister, the duty of the Chinese Prime Minister and the Japanese Prime Minister to ensure the life and survival of the human race and, therefore, the life and survival of the populations of peoples not directly under their political responsibility? If sovereignty is power without

limit, why use it to set people against people, women against women, men against men, widows against widows, orphans against orphans?

National sovereignty is outdated. It must be replaced by global sovereignty. It is difficult for national sovereignty to coordinate economic policies effectively in the context of globalisation.

It should be noted at this point that, in our view, global sovereignty cannot be equated with globalised governance or corporate governance. Nor can it be reduced to a question of transparency and traceability or accountability.

Globalisation and the globalisation of production cannot be managed efficiently with borders, and therefore with the concept of national sovereignty, even when interpreted from the perspective of global governance, traceability, international standards, predictability, social responsibility, etc. There is no shortage of examples where modern interpretations of national sovereignty have failed in their application. There are many examples of situations in which modern interpretations of national sovereignty have failed in their application: Cancún, COP 21 (the withdrawal of the United States, for example), the Doha Development Round, etc. Even at the regional level, there are examples such as Brexit and the EU's recurring difficulties in agreeing on a budget for the Union etc.

The future of humanity cannot be managed by default by civil society or by corporate management principles alone. The public good that is "the existence of the human species" must be managed democratically on a global scale.

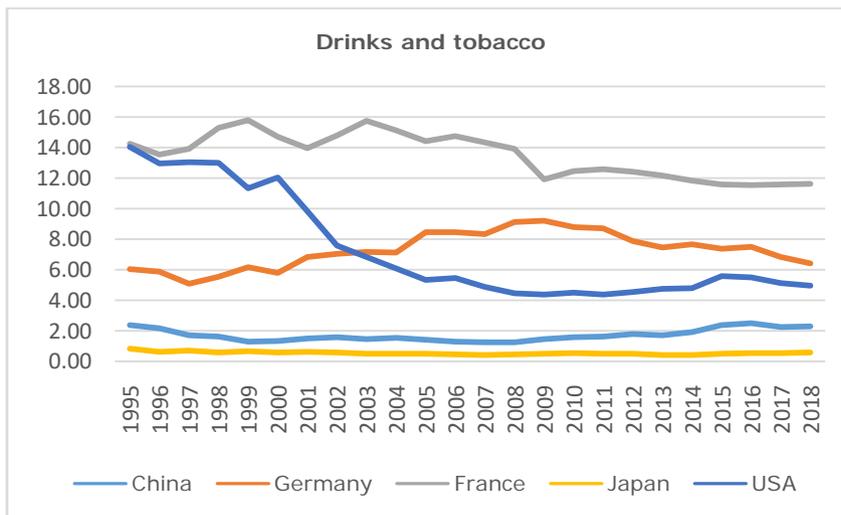
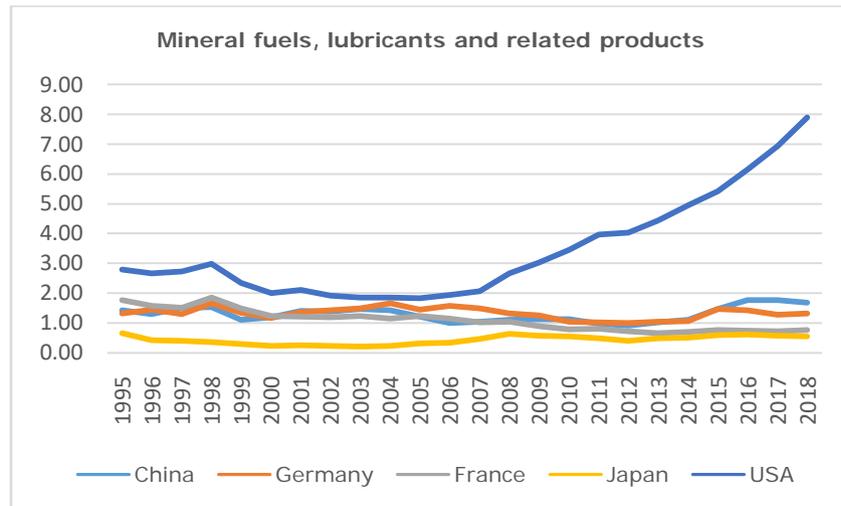
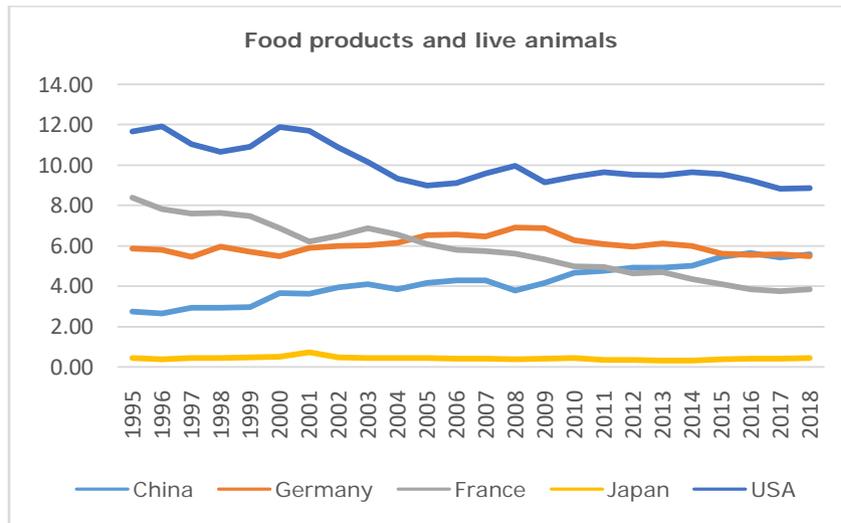
In short, contrary to what Acharya (2001) maintains, the alternative, which may seem simplistic, is global sovereignty. Indeed, coordination and its effectiveness in a discriminatory principle only exist because the balance of power is unbalanced in favour of one party or is totally balanced. In the latter case, the ambitions of the different parties must be equal. The strengthening of national sovereignty and institutions in an increasingly interdependent world can only increase the inefficiency of the resulting global coordination and governance while creating frustration and encouraging measures and actions of defiance.

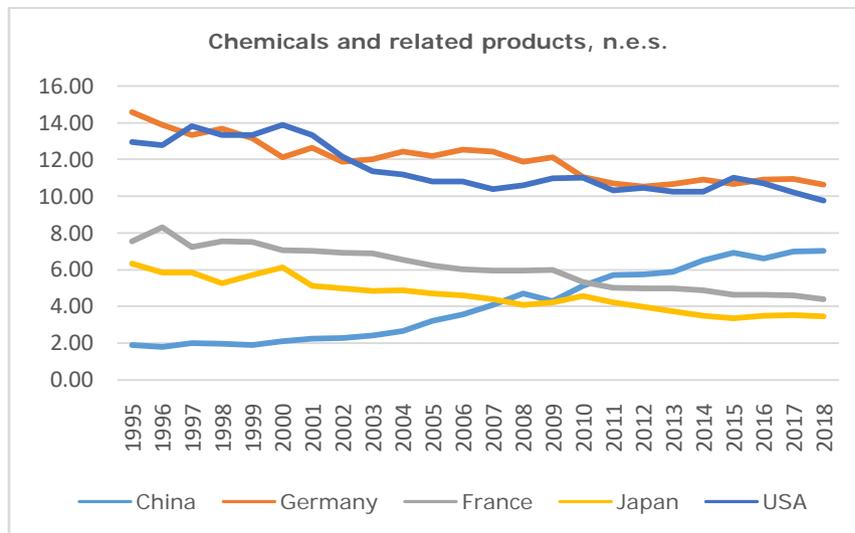
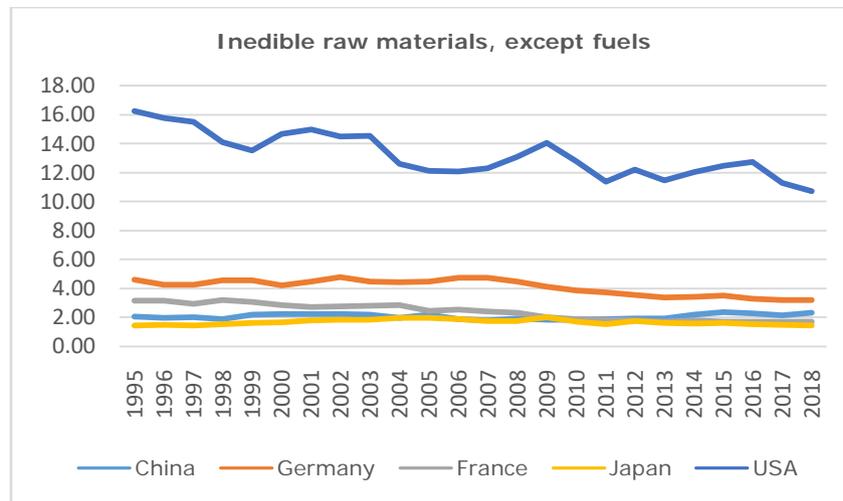
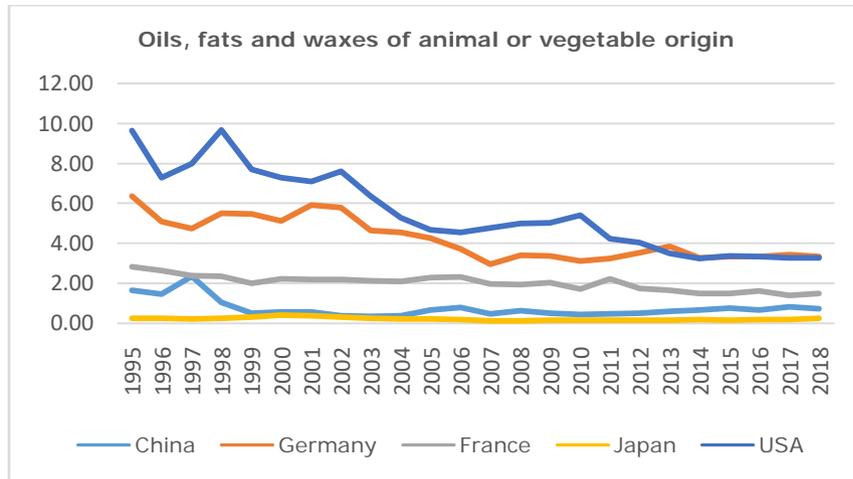
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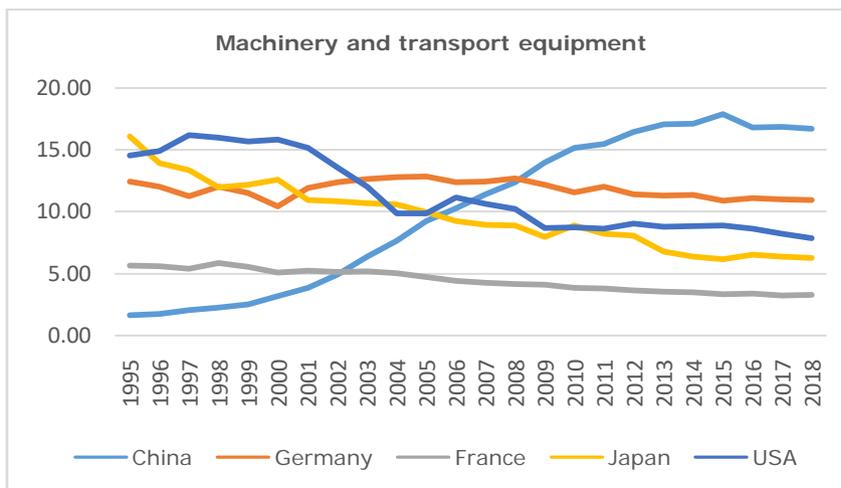
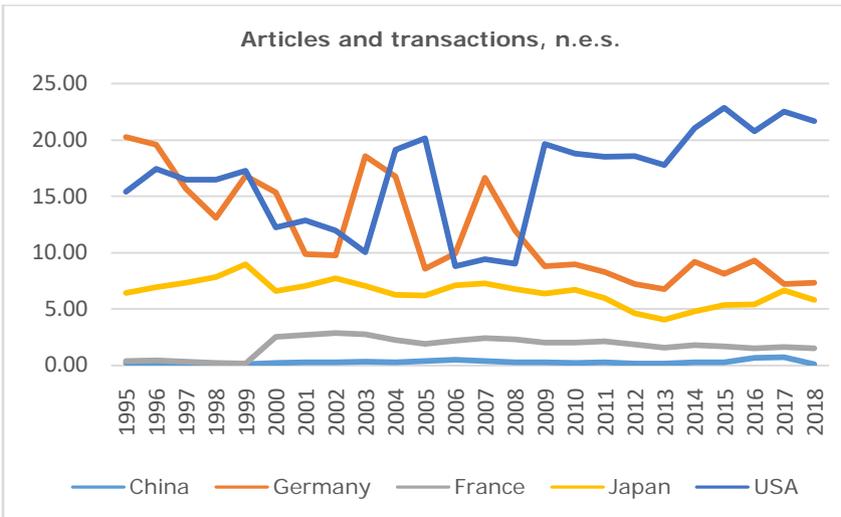
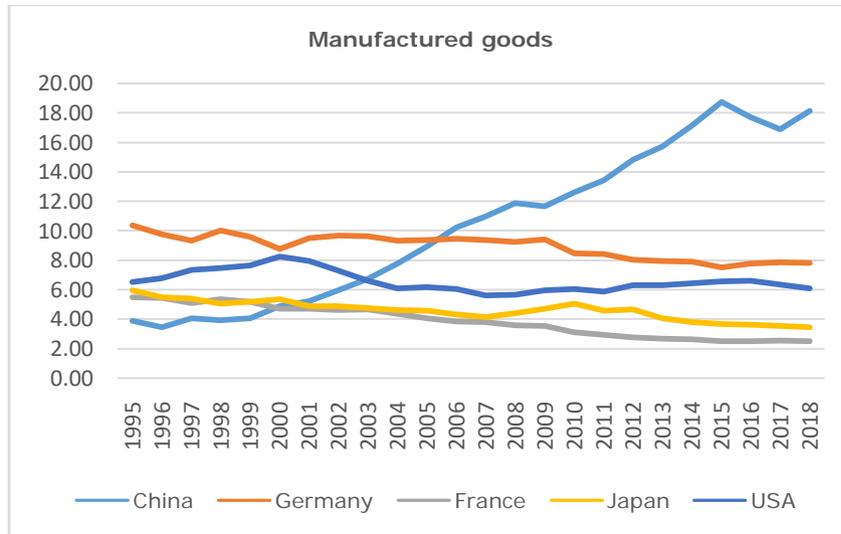
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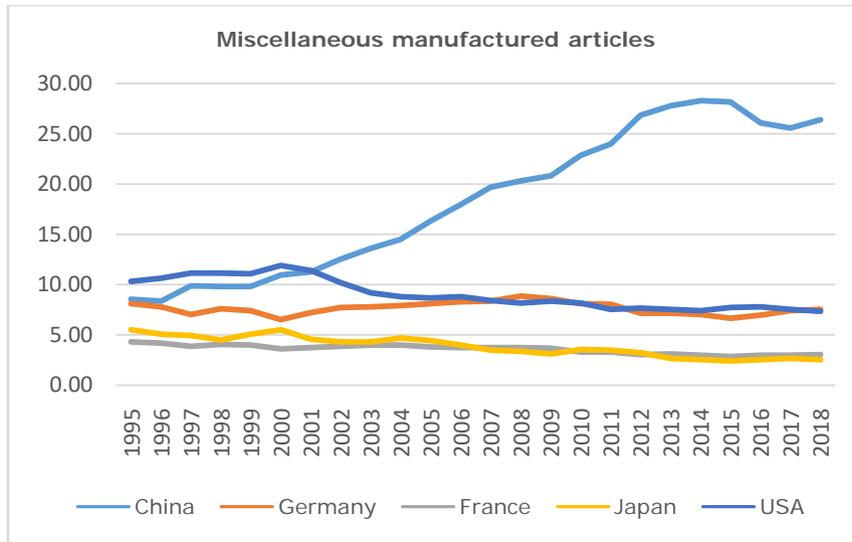
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APPENDICES



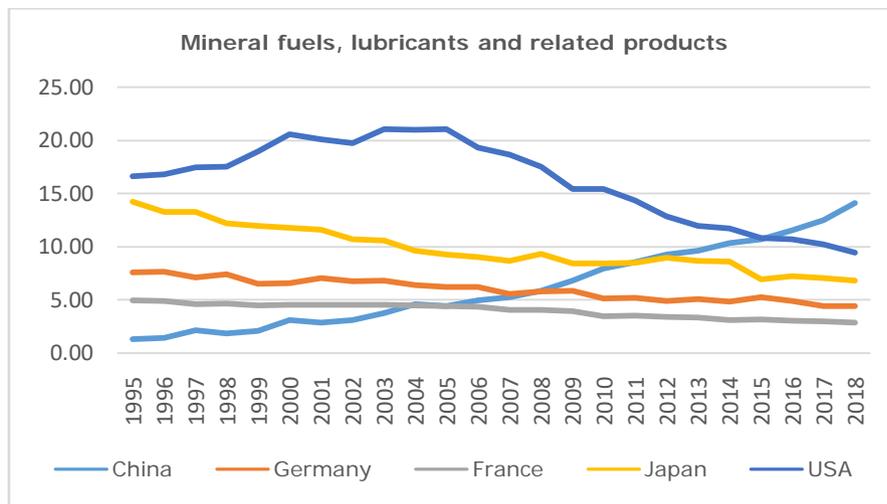
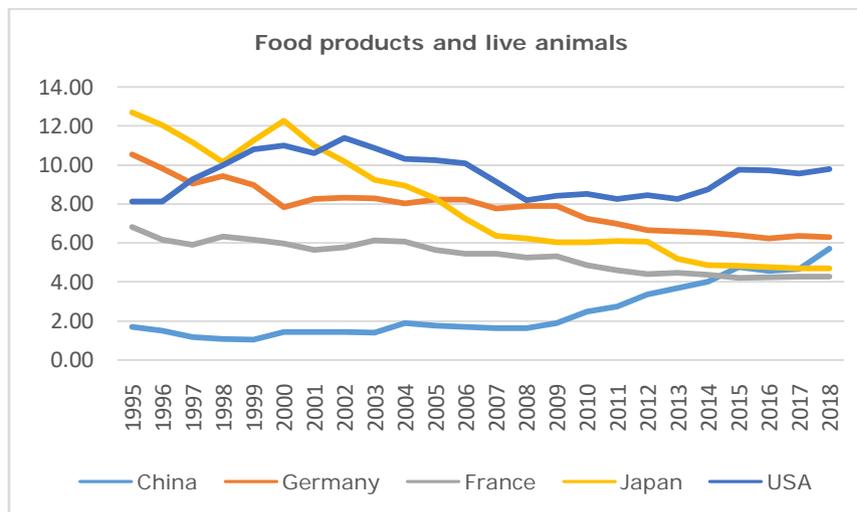


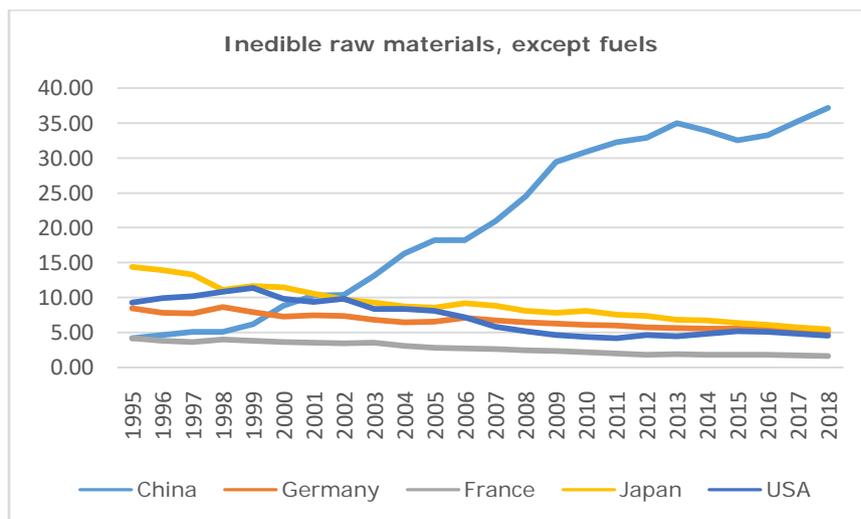
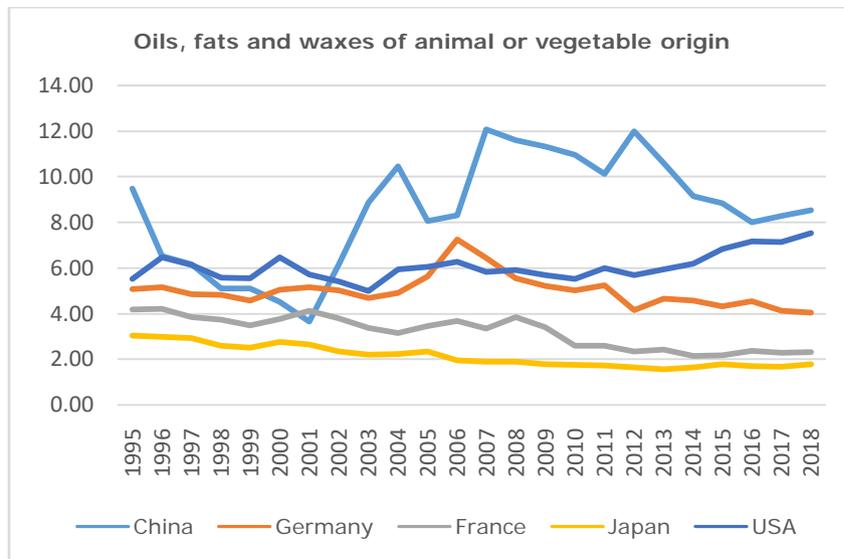
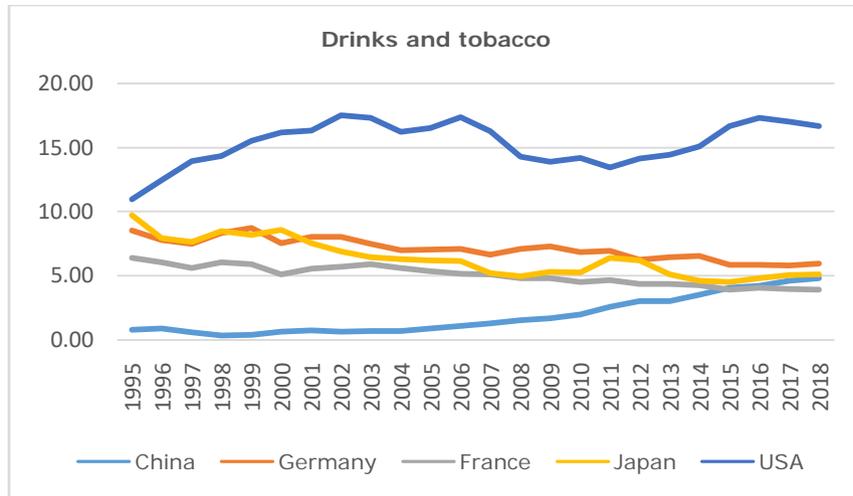


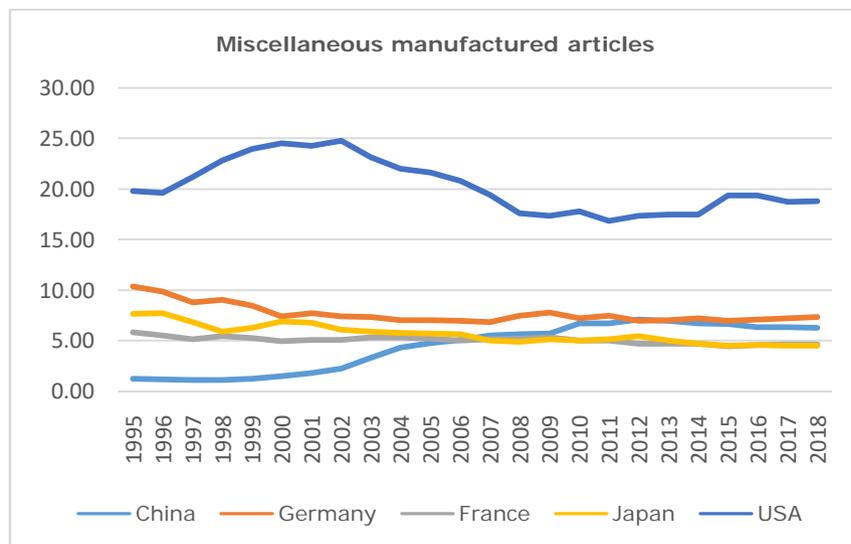
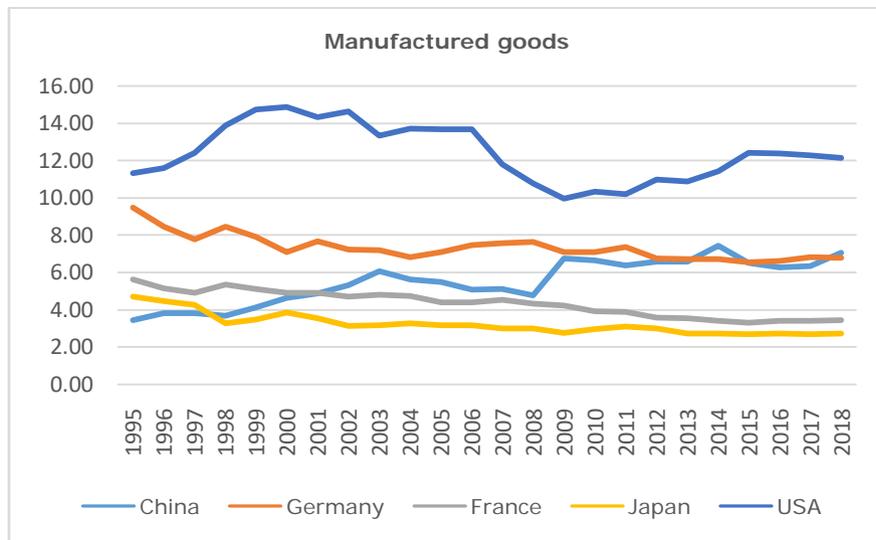
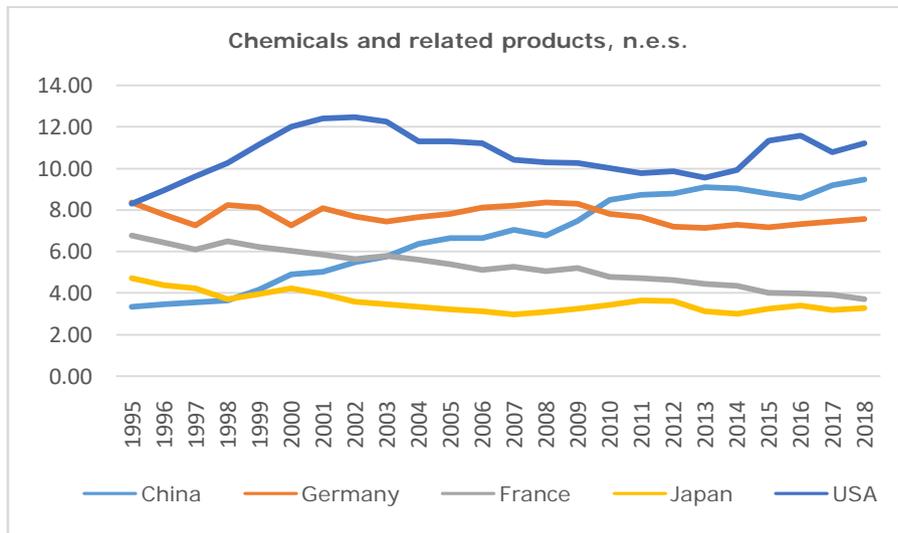


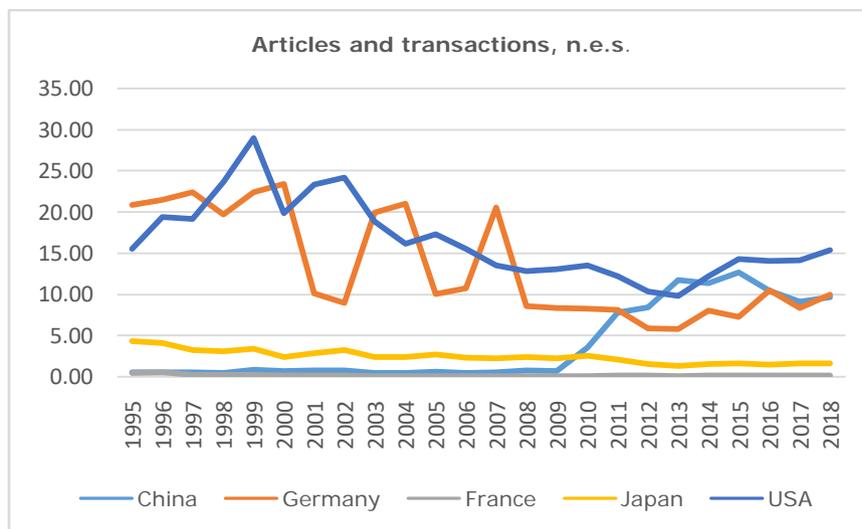
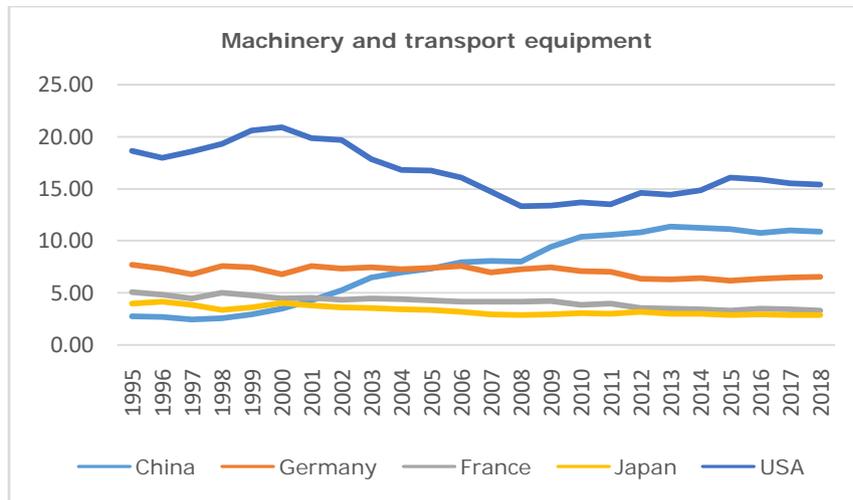
Source: UNCTAD data and author's calculations

Figure 3: Changes in the Export Profile of China, the USA, Japan, France and Germany Over the Period 1995-2018



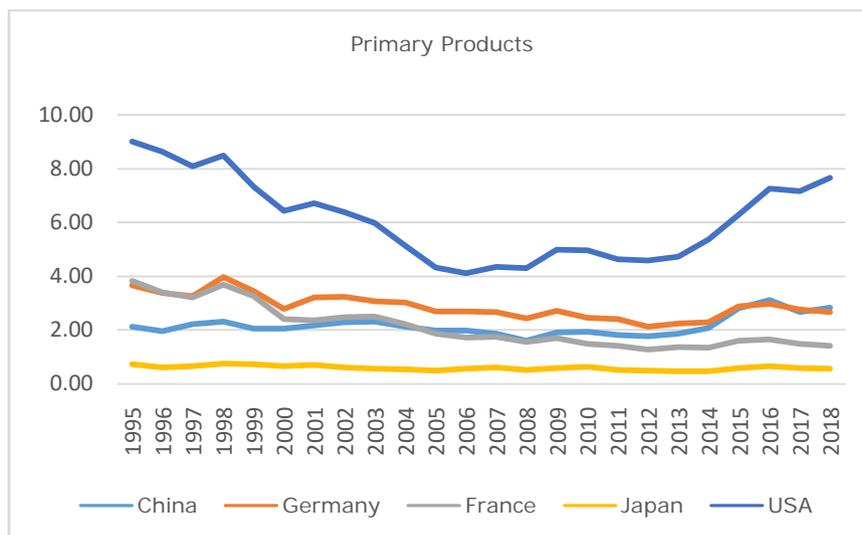


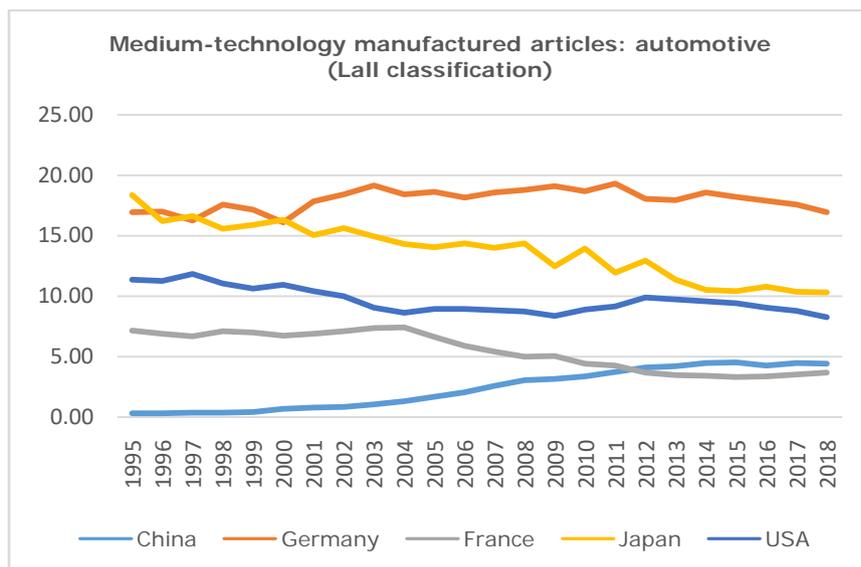
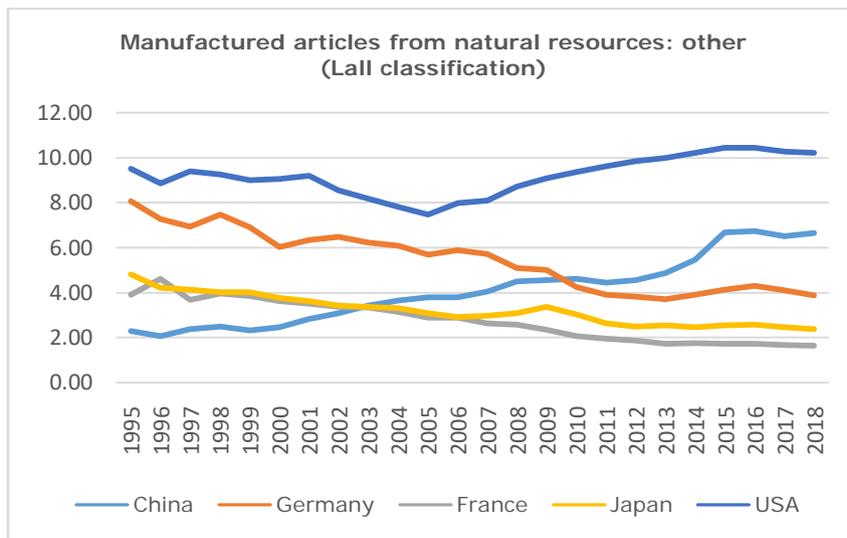
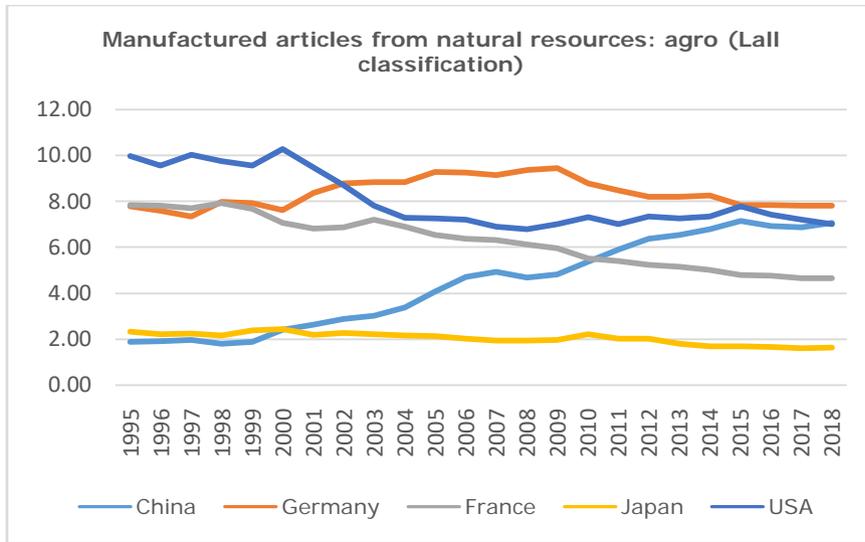


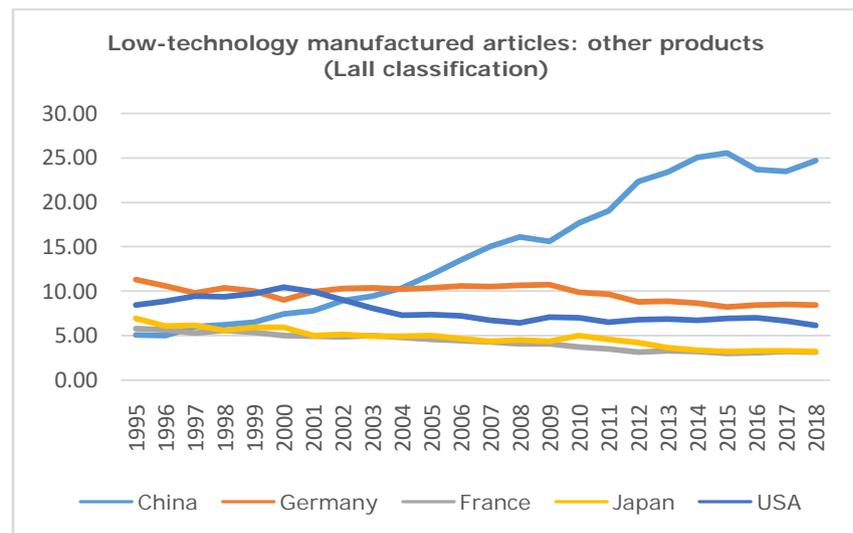
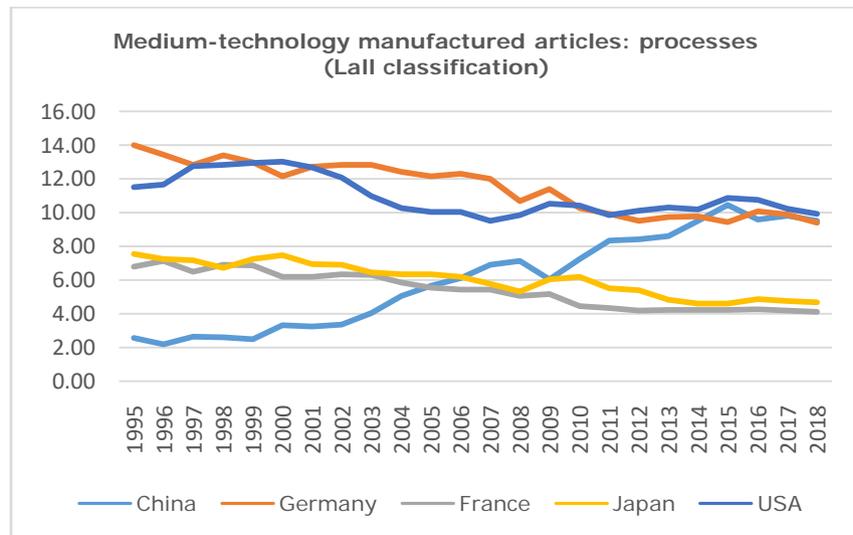
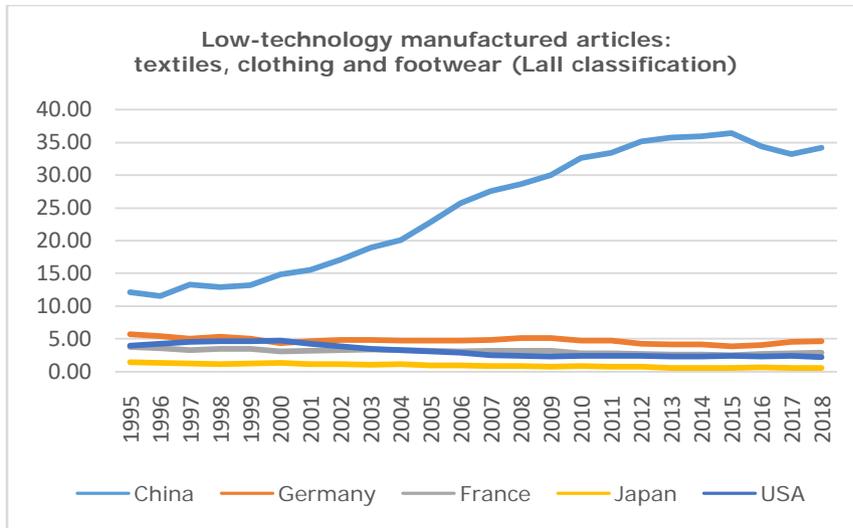


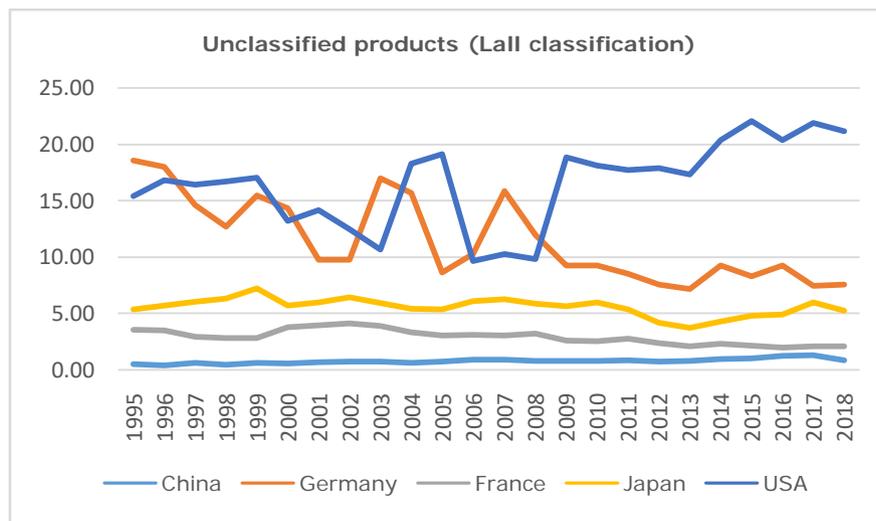
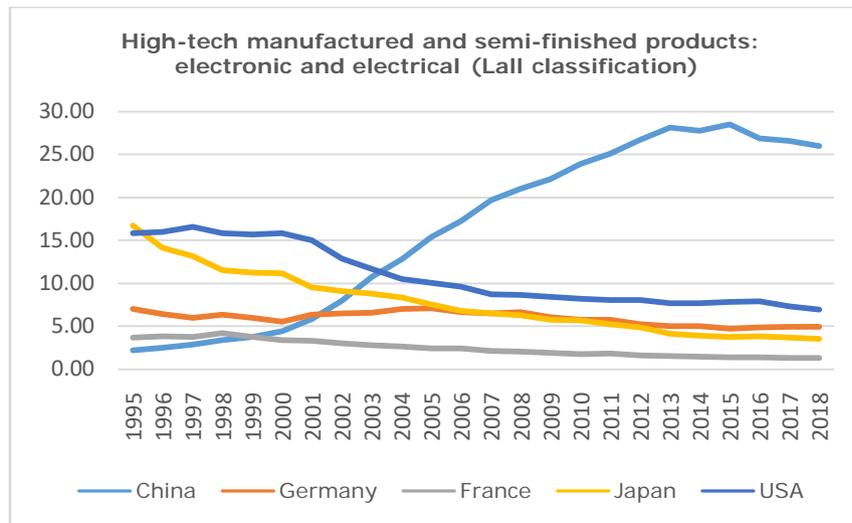
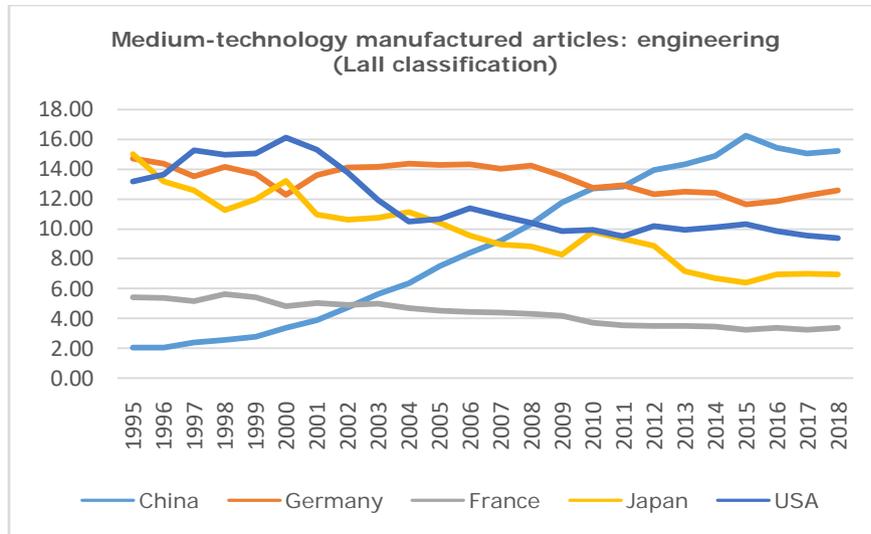
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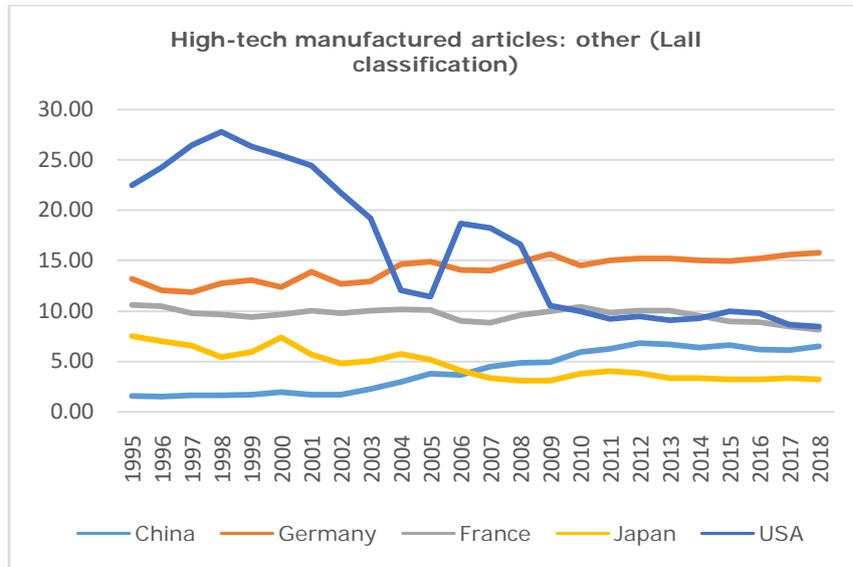
Figure 4: Evolution of the Import Profile of China, the USA, Japan, France and Germany over the Period 1995-2018





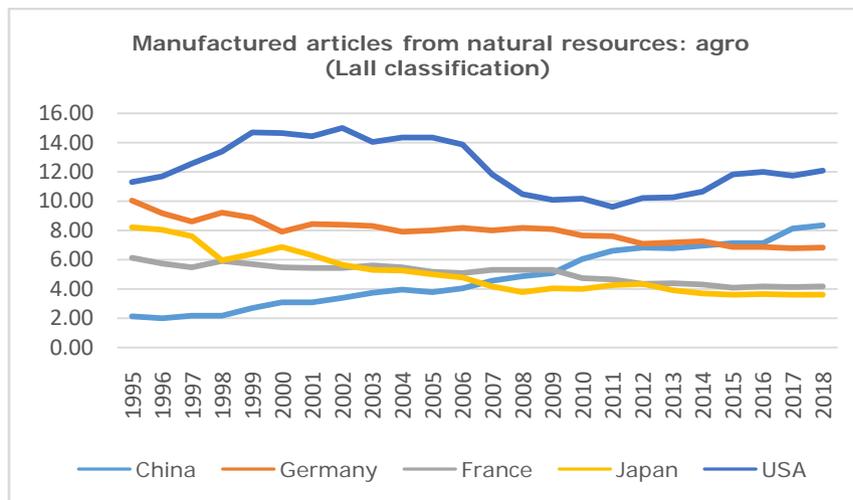
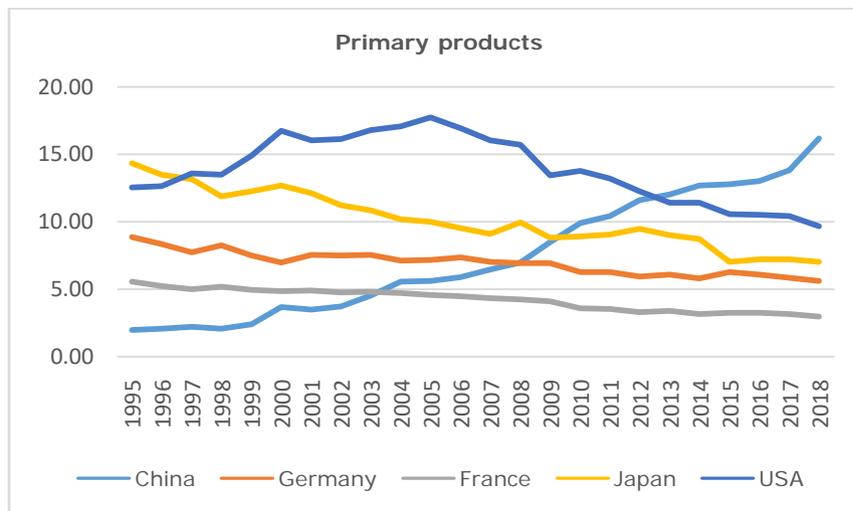


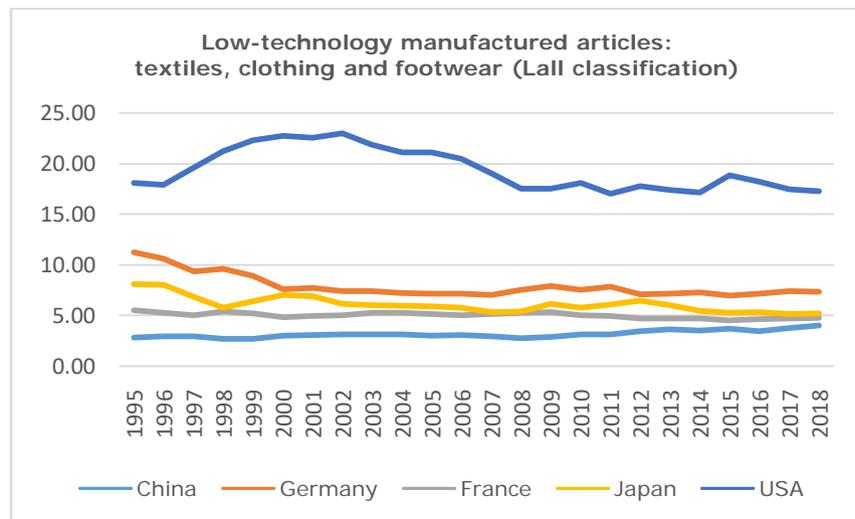
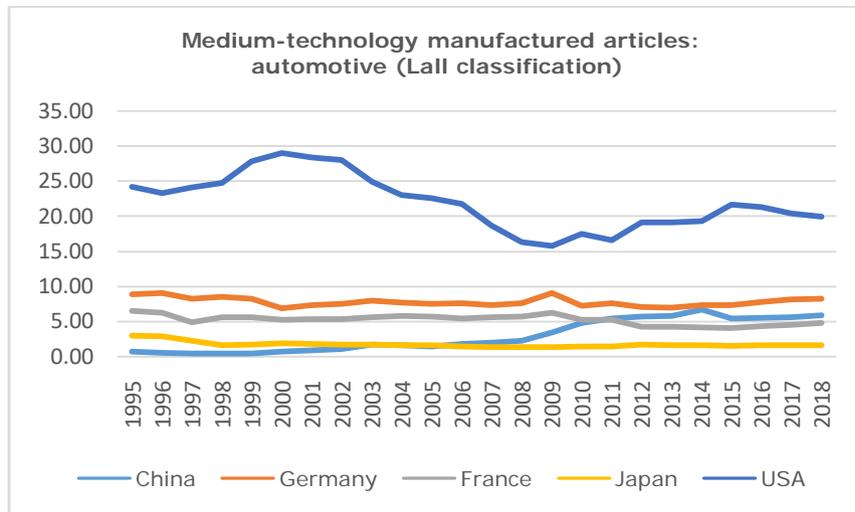
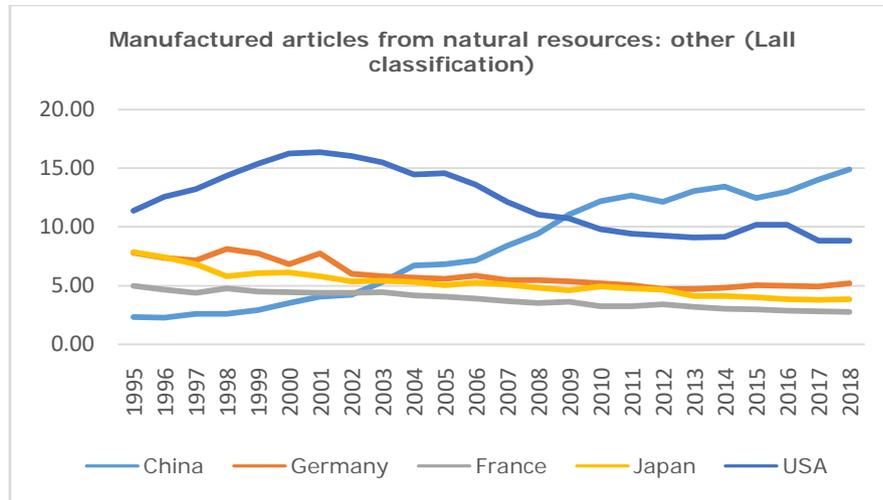


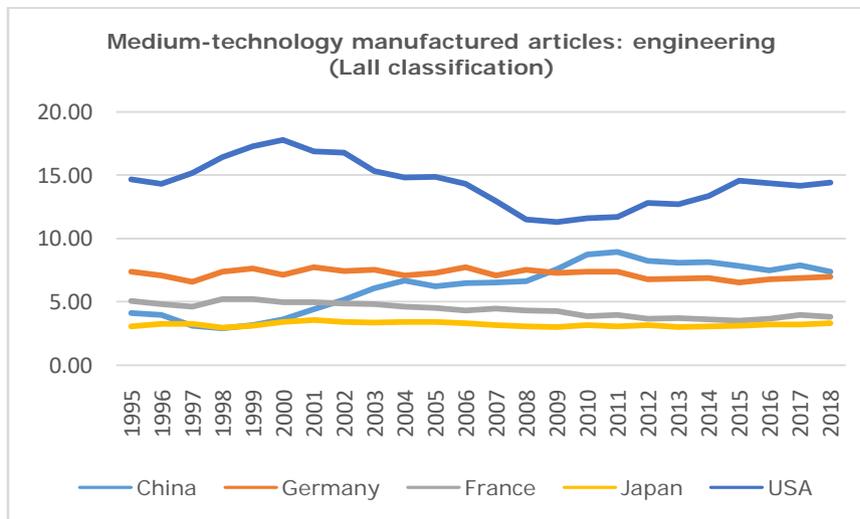
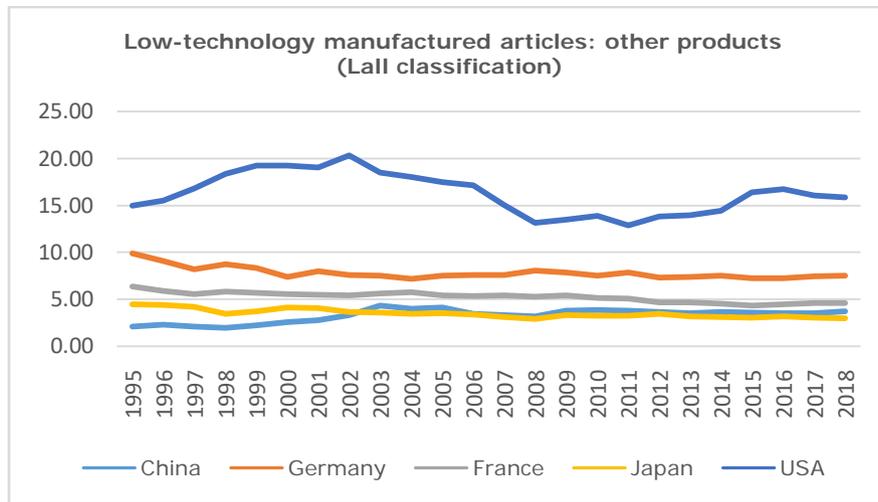
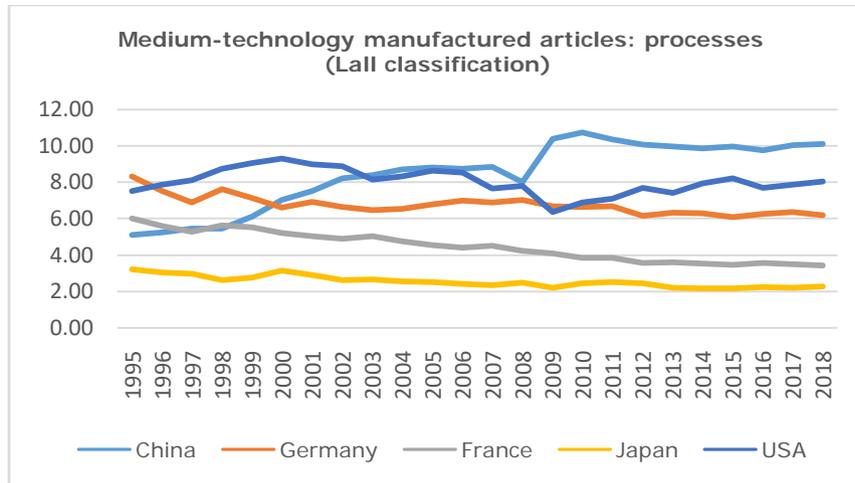


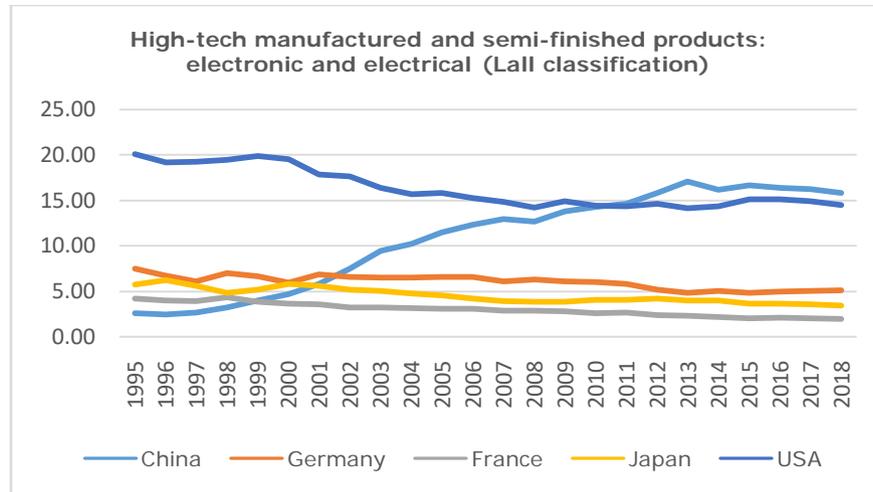
Sources: UNCTAD data and author's calculations

Figure 5: Evolution of the Export Profile According to the Lall Classification of China, the USA, Japan, France and Germany over the Period 1995-2018









Source: UNCTAD data and author's calculations

Figure 6: Evolution of the Import Profile of China, the USA, Japan, France and Germany over the Period 1995-2018

¹ We include protectionist theorists in this category, even if this is debatable.

² <http://pise.info/eco/citations.htm> (consulted on 17/03/2020 at 18:21 GMT).

³ L'Economie Politique Patronale (1889), BnF, https://data.bnf.fr/12198421/antoine_de_montchrestien_traite_de_l_economie_politique/

⁴ According to Dostaler, Gilles (2009) "Alternatives économiques" No 280.

⁵ Quoted by Caire (1965).

⁶ According to some authors, this position was accepted by Adam Smith (1776).

⁷ This is to be expected, as China is still a newly industrialised country and has not yet got rid of low value-added technologies such as textile and clothing manufacturing.

⁸ For more details on these figures, see the World Intellectual Property Organisation website and the report by its Director General (Mr Francis Gurry). https://www.wipo.int/pressroom/fr/articles/2020/article_0005.html

⁹ <https://www.les-theses.fr/russeurope-en-exil-souverainete-souverainete-economique-et-la-question-des-formes-de-mise-en-oeuvre-par-jacques-sapir/>

¹⁰ Quoted by Sapir (2019)

¹¹ Expression borrowed from Mouffe (2010).

¹² EU: European Union

¹³ CUSMA: Canada, United States and Mexico Agreement (formerly NAFTA)

¹⁴ ASEAN: Association of Southeast Asian Nations

¹⁵ AfCFTA: African Continental Free Trade Area

¹⁶ ECOWAS: Economic Community of West African States.

¹⁷ These migrations are justified because they are the most profitable, given the crisis and strong global demand.



Impact of Good Governance on Financial Inclusion in India: Evidence from the ARDL Bounds Testing Approach

By Aashi Jain, Ayushi Vashistha & C. R. Bishnoi

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Abstract- Purpose: Financial inclusion plays a crucial role in a country's economic development. In India, the Reserve Bank of India has actively promoted financial inclusion since 2005. This study examined the impact of good governance on financial inclusion in India by analyzing data from 1996 to 2021 using the Autoregressive Distributed Lag (ARDL) model.

Methodology: The study considered the Financial Inclusion Index as the dependent variable, while good governance indicators: Control of Corruption, Government Effectiveness, Political Stability, Regulatory Quality, Rule of Law and Voice and Accountability, were taken as independent variables. Additionally, GDP per capita, Foreign Direct Investment (FDI) and inflation were incorporated as control variables to ensure robust results. The ARDL model, which accommodates variables integrated at different orders, was used to examine both long-run and short-run relationships between financial inclusion and other variables.

Keywords: ARDL model, economic growth, financial inclusion, good governance, growth determinants.

GJMBR-B Classification: JEL Code: C22, O47



Strictly as per the compliance and regulations of:



Impact of Good Governance on Financial Inclusion in India: Evidence from the ARDL Bounds Testing Approach

Aashi Jain ^α, Ayushi Vashistha ^ο & C. R. Bishnoi ^ρ

Abstract- Purpose: Financial inclusion plays a crucial role in a country's economic development. In India, the Reserve Bank of India has actively promoted financial inclusion since 2005. This study examined the impact of good governance on financial inclusion in India by analyzing data from 1996 to 2021 using the Autoregressive Distributed Lag (ARDL) model.

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Findings: The results indicate that economic factors, such as GDP per capita and FDI, significantly enhanced financial inclusion in India. Among governance indicators, Control of Corruption and Regulatory Quality negatively affected financial inclusion, suggesting that better governance can improve access to financial services.

Practical Implications: The findings highlight that policymakers should balance governance reforms with economic growth to enhance financial inclusion. While GDP per capita and FDI contributed to financial inclusion, governance indicators had mixed effects, necessitating careful policy design. Strengthening transparency, regulatory efficiency and institutional quality can create a more inclusive financial system.

Originality: This study contributes to the literature by systematically analyzing the role of governance in financial inclusion using a robust econometric framework and a comprehensive set of governance indicators.

Keywords: ARDL model, economic growth, financial inclusion, good governance, growth determinants.

I. INTRODUCTION

Financial inclusion has emerged as a vital component of economic development in recent years, particularly in developing countries like India. The concept refers to providing affordable access to a broad range of financial services to all segments of society, particularly the vulnerable and underprivileged. Financial inclusion aims to integrate the unbanked population into the formal financial system, thereby enhancing their standard of living and contributing to overall economic growth. The Reserve Bank of India (RBI) played a pivotal role in this regard. The RBI shifted its focus in 2005 from merely providing loans to underprivileged groups to offering a broader range of financial services. This marked the formal introduction of "financial inclusion" in India, a term officially presented by then RBI Governor Yaga Venugopal Reddy in the 2005-2006 Annual Policy Statement (RBI, 2005). Recognising the exclusionary nature of existing banking practices, the RBI encouraged banks to reassess and broaden their services to ensure that they catered to all segments of society, with an emphasis on integrating individuals into the financial system rather than simply extending credit.

The importance of financial inclusion extends beyond the mere growth of the financial sector; it plays a crucial role in reducing poverty, promoting economic stability and fostering sustainable development. According to the committee on Financial Inclusion, headed by Dr. C. Rangarajan (2008) financial inclusion is defined as the process of ensuring that vulnerable groups, such as weaker sections and low-income populations, have access to suitable financial products and services at an affordable cost, provided fairly and transparently by mainstream institutional players. Numerous studies have demonstrated that inclusive finance contributes not only to financial stability but also to long-term economic growth, reduced income inequality and poverty eradication. Studies by Schumpeter (1911), Goldsmith (1969) and McKinnon (1973) have emphasised the strong link between financial development and economic growth,

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suggesting that integrating more people into the financial system can significantly enhance economic outcomes.

A substantial body of empirical research highlights the strong influence of financial inclusion on key economic factors like poverty reduction, income inequality, human development and overall economic growth (Laha, 2015; Lenka & Sharma, 2017; Park & Mercado, 2017; Zhang & Posso, 2017). Recognising its pivotal role in shaping broader economic outcomes, both developed and developing nations across the globe are striving to achieve universal access to financial services.

However, the success of financial inclusion initiatives is intricately linked to the quality of governance in a country. Good governance, defined as the effective exercise of authority to manage a country's economic, social and political assets, plays a crucial role in ensuring that financial inclusion efforts reach their full potential. Good governance encompasses various dimensions, including the rule of law, transparency, accountability, political stability and the efficient management of public resources. It provides a conducive environment for financial inclusion by ensuring that policies and regulations are implemented effectively, that resources are allocated fairly and that corruption is minimised.

Eldomiaty et. al, (2020) identifies six key institutional factors, known as World Governance Indicators (WGIs), that influence financial inclusion globally. These include Control of Corruption, Government Effectiveness, Political Stability, Voice and Accountability, Regulatory Quality and Rule of Law. These indicators reflect the quality of governance and institutional strength within a country and are found to significantly impact the access to and usage of financial services across diverse world economies.

While good governance has been widely examined for its role in fostering economic development and social stability, there is still a considerable gap in research regarding its impact on financial inclusion. Despite the well-established potential of good governance to create an enabling environment for financial access by promoting transparency, reducing corruption and strengthening institutional effectiveness, there is a lack of comprehensive studies investigating how governance quality directly influences financial inclusion in India. This gap highlights the need for focused research to fully understand and leverage the role of good governance in advancing financial inclusion in the country.

In the context of India, good governance has been a critical factor in the success of financial inclusion initiatives. The Indian government, alongside the RBI,

has undertaken various measures to promote financial inclusion, including the implementation of social banking policies, the expansion of digital financial services and the introduction of regulatory frameworks aimed at enhancing financial access for all citizens. However, challenges remain, particularly in rural areas where financial inclusion lags as compared to urban areas.

Good governance is essential for the successful implementation of financial inclusion strategies in India. It ensures that financial services are accessible, affordable and fair, particularly for the most vulnerable segments of society. Moreover, good governance fosters an environment of trust and accountability, which is crucial for encouraging people to participate in the formal financial system. As India continues its journey toward greater financial inclusion, the role of good governance cannot be overstated. By ensuring that governance structures are robust, transparent and effective, India can achieve its goal of inclusive financial development, thereby promoting economic growth, reducing poverty and improving the quality of life for all its citizens.

To the best of our knowledge, no existing study examines the effect of good governance on financial inclusion in the context of India. This research aims to bridge this gap by highlighting the crucial role of good governance in advancing financial inclusion. By analysing the relationship between governance and financial inclusion, this study provides valuable insights into how India can enhance its financial inclusion efforts. The findings will contribute to the broader discourse on financial inclusion and governance, offering policy recommendations to help India achieve its financial inclusion goals and promote sustainable economic development.

The remainder of this research paper is structured as follows: Section on methodology presents the econometrics model, data and variables used in the analysis. The next section describes the estimation techniques employed in the study. The section on results and discussions outlines the results and provides a discussion of the statistical findings. Finally, the last section summarises the key findings of the research and discusses the policy implications.

II. METHODOLOGY

a) *Econometric Model*

This section first outlines the econometric model employed to examine the effects of governance indicators on financial inclusion in India. The analysis utilises the Autoregressive Distributed Lag (ARDL) model, as proposed by Pesaran et al. (2001), to assess these effects. The model used in this study is as follows:

$$\ln FII_t = \beta_0 + \ln CC_t + \ln GE_t + \ln PS_t + \ln RQ_t + \ln ROl_t + \ln VA_t + \ln GDPPC_t + \ln FDI_t + \ln IN_t + \mu_t \quad (1)$$

In equation (1), FII represents the financial inclusion index; CC, GE, PS, RQ, ROL and VA denote governance indicators and GDPPC, FDI and IN are control variables. These variables consist of a mix of macroeconomic and governance indicators. To further

examine the impact of good governance on financial inclusion in India, this study utilises data from 1996 to 2021, selected based on the availability of data. The definition and sources of variables used in the study are given in Table 1.

Table 1: Definition and Sources of Variables

Variable	Symbol	Definition	Source
Dependent Variable- Financial Inclusion Index			
Financial Inclusion Index	FII	FII measures the extent of access, usage and penetration of financial services within a population.	Calculated by authors
Independent Variable- Good Governance Indicators			
Control of Corruption	CC	CC measures the perception of the degree to which public power is employed to prevent personal gains from public power and public assets. To streamline, this and the subsequent variables are represented as percentile ranks ranging from 0 to 100	WGI
Government Effectiveness	GE	GE measures the quality of public and civil services provided to citizens, focusing on their operation as politically neutral organisations	WGI
Political Stability	PS	PS is employed to assess the likelihood of encountering political instability within the pertinent country	WGI
Regulatory Quality	RQ	RQ assesses a government's capacity to formulate and implement effective policies that foster and enhance private-sector engagement and development	WGI
Rule of Law	ROL	ROL describes the extent to which property rights, agreements, police, courts and legal actions against violence and crime are enforced	WGI
Voice and Accountability	VA	VA gauges the extent to which citizens enjoy the freedom to choose their government, express themselves freely, associate without constraints and experience media freedom	WGI
Control Variables			
Gross Domestic Product per capita	GDPPC	Per capita GDP is calculated by dividing the GDP by the midyear population. The presented data is expressed in constant 2015 U.S. dollars annually	WDI
Foreign Direct Investment	FDI	FDI represents the net inflow of foreign investments. The series reflects the net inflows into the Indian economy from foreign investors and is normalised by dividing it by the GDP	WDI
Inflation	IN	IN shows the rate of price change in the economy as a whole	WDI

Note: WGI-World Governance Indicators, WDI-World Development Indicators

Source: Prepared by authors.

b) *Dependent Variable - Financial Inclusion Index for India*

The dependent variable in this analysis is the Financial Inclusion Index (FII) for India. It is constructed using the methodology given by Sarma (2008). The FII is constructed first by calculating a dimension index for three dimensions of financial inclusion-availability of banking services, banking penetration and usage of the

banking system. The study uses six indicators under three dimensions to measure financial inclusion, as mentioned in Table 2.



Table 2: Dimensions and Indicators of Financial Inclusion

S. N.	Dimensions	Indicators
1.	Availability of Banking Services	1. Number of bank branches per million population
2.	Banking Penetration	2. Number of deposit accounts per 1,000 population 3. Number of credit accounts per 1,000 population
3.	Usage of Banking System	4. Per capita deposit 5. Per capita credit 6. Credit-to-deposit ratio.

Source: Prepared by authors.

To calculate the FII first, the dimension index for each indicator in India is calculated using the following formula:

$$d_i = \frac{A_i - m_i}{M_i - m_i} \quad (2)$$

Where:

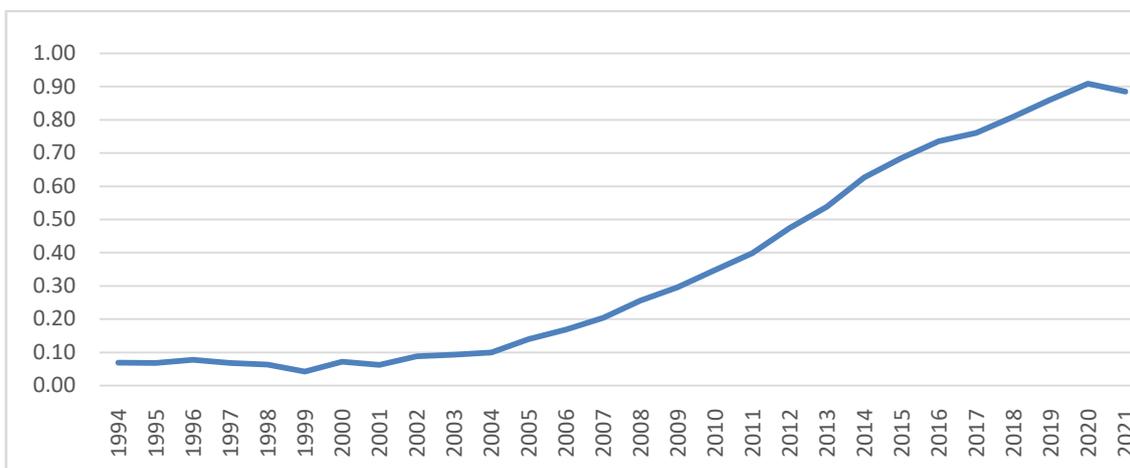
- A_i = Actual value of dimension i
- m_i = Minimum value of dimension i
- M_i = Maximum value of dimension i
- d_i = Dimension index of financial inclusion

This formula ensures that $0 \leq d_i \leq 1$. The value of d_i indicates how well a region has performed in a specific dimension. If n dimensions of financial inclusion are considered, a region will be represented as a point $D_i = (d_1, d_2, d_3, \dots, d_n)$ in the n -dimensional

Cartesian space. In this n -dimensional space, the point $O = (0, 0, 0, \dots, 0)$ represents the worst-case scenario, while the point $I = (1, 1, 1, \dots, 1)$ represents the best performance across all dimensions. The FII for the i^{th} region is then calculated using the normalised inverse Euclidean distance of the point D_i from the ideal point $I = (1, 1, 1, \dots)$ using the following formula:

$$FII_i = 1 - \frac{\sqrt{(1-d_1)^2 + (1-d_2)^2 + \dots + (1-d_n)^2}}{\sqrt{n}} \quad (3)$$

This formula normalises the Euclidean distance of D_i from the ideal point by n and the inverse distance is subtracted by 1. This normalisation ensures that the FII value ranges between 0 and 1, where a higher FII value indicates greater financial inclusion. The FII for India, as calculated, is depicted in Figure 1.

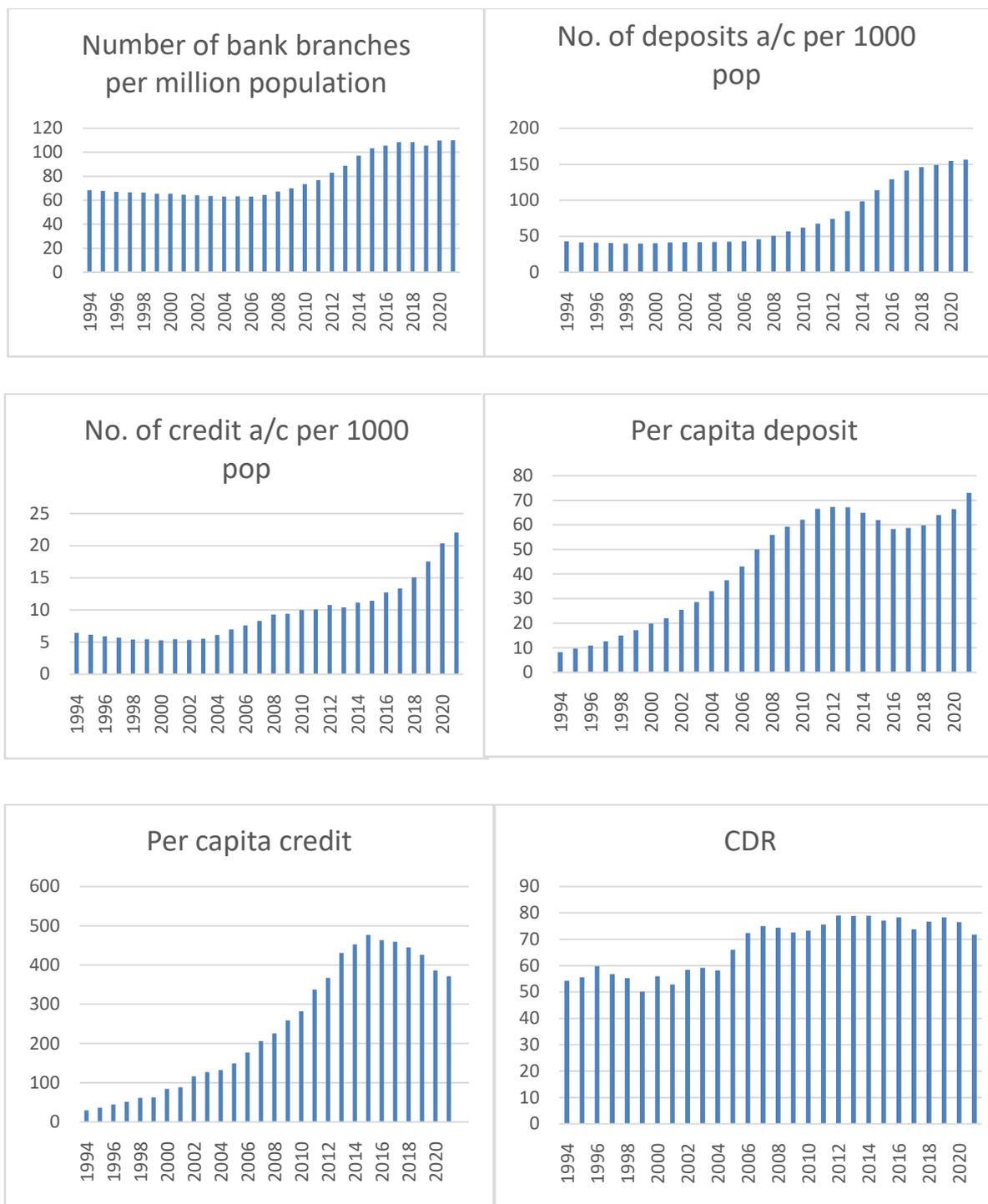


Source: Prepared by authors.

Figure 1: Financial Inclusion Index for India

It is evident from Figure 1 that the FII values have shown a steady increase over the years. The initial years from 1994 to 2002 witnessed minimal growth, with FII values remaining relatively stagnant. However, from 2003 onward, there has been a noticeable upward trend, indicating a significant improvement in the FII values. The highest level of inclusion was observed in 2020, where the FII value approached 0.90. Although there was a slight decline in 2021, the overall trend suggests a consistent improvement in financial inclusion over the selected period. The FII values predominantly

lie between 0.20 and 0.90, indicating a transition from low to high levels of financial inclusion in India over time. Additionally, an analysis of six key indicators for India has been conducted to explore the factors that impact the value of FII. This analysis provides important insights into the dynamics of access, usage and market penetration over the period. Figure 2 illustrates the analysis of these six FII indicators for India.



Source: Prepared by authors.

Figure 2: Trend of Six Indicators of FII for India

Figure 2 provides a comprehensive view of financial inclusion in India by illustrating key indicators of financial inclusion over time. The availability of banking services, indicated by the number of bank branches per million population, initially shows a slight decline. This suggests a reduction in the physical banking infrastructure, which may be attributed to the growing

reliance on digital banking solutions, reducing the need for traditional brick-and-mortar branches. However, the number of bank branches per million population increased rapidly after 2006.

In terms of banking penetration, which is measured by the number of deposit accounts per 1,000 population, the graph reveals some initial fluctuations

and a decline. However, as time progresses, the trend begins to stabilise and move upward, signifying an increase in access to banking services for a broader section of the population. This growing access is a positive indicator of enhanced financial inclusion. Credit penetration, represented by the number of credit accounts per 1,000 population, follows a similar pattern. The data shows fluctuations, but overall, India has seen growth in credit access over the years. This increase highlights the expanding availability of credit facilities, allowing more people to engage in economic activities that require borrowing, such as business ventures or personal investments.

Per capita deposits have been steadily increasing, as shown by the upward trend in the graph. This rise reflects a greater capacity for saving among the Indian population, which is crucial for financial stability and long-term security. Similarly, per capita credit has also risen, indicating improved borrowing capacity, which supports both consumption and investment- key drivers of economic growth.

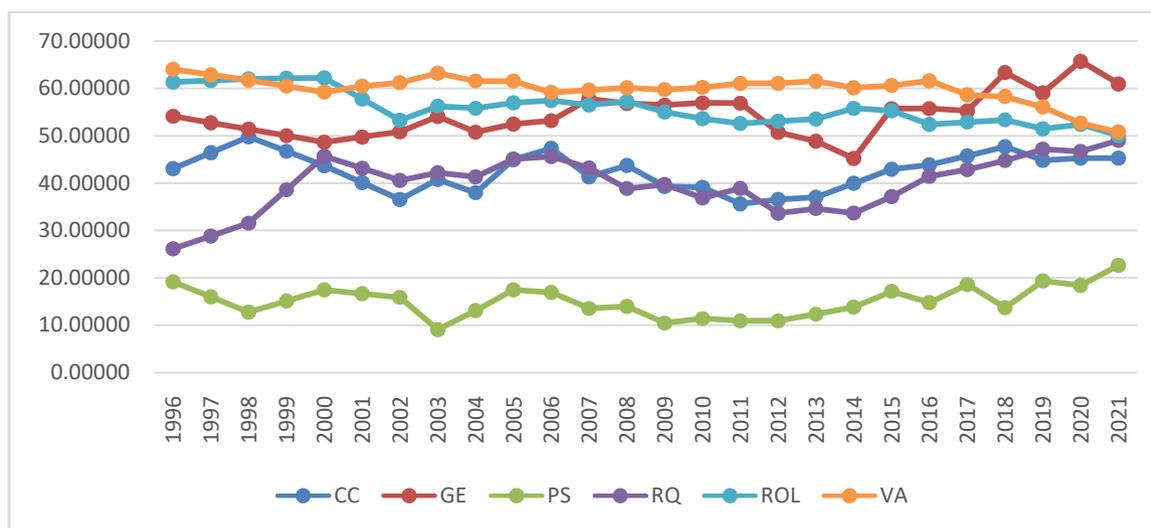
Lastly, the credit-deposit ratio, which compares the total loans extended by banks to the total deposits, shows a consistent upward trend in India. This indicates that banks are extending credit in proportion to their deposits, reflecting a healthy and balanced financial system. Despite fluctuations in some indicators, the overall trend points toward greater financial inclusion, with improved access to both credit and deposit services, even as the physical banking infrastructure has declined. This highlights India's ongoing transition toward a more digital and inclusive financial environment.

c) *Independent Variables- Good Governance Indicators*

For the independent variables, the study considers the good governance indicators, which include the following:

1. *Control of Corruption (CC)*: CC measures the extent to which public power is used for private gain, including both petty and grand corruption, as well as the capture of the state by elites and private interests.
2. *Government Effectiveness (GE)*: GE assesses perceptions of public service quality, the independence of the civil service from political pressures, the quality of policy formulation and implementation and the credibility of government commitments.
3. *Political Stability (PS)*: PS evaluates perceptions of political stability and the likelihood of politically motivated violence, including terrorism.
4. *Regulatory Quality (RQ)*: RQ gauges the government's ability to formulate and implement policies and regulations that promote private sector development.
5. *Rule of Law (ROL)*: ROL provides insight into confidence in and adherence to societal rules, focusing on contract enforcement, property rights, the police, the courts and the likelihood of crime and violence.
6. *Voice and Accountability (VA)*: VA reflects perceptions of citizens' participation in selecting their government and includes freedom of expression, association and media freedom.

These governance indicators are expressed in percentile ranks from 0 to 100, as shown in Figure 3, where higher ranks indicate stronger governance. For consistency, biannual data from 1996 to 2002 were converted to annual data using linear interpolation.



Source: Prepared by authors.

Figure 3: Trend of Good Governance Indicators

d) *Control Variables*

In addition to taking good governance indicators as independent variables, this study also incorporates three control variables that are potentially relevant to financial inclusion. These control variables are GDP per capita, foreign direct investment (FDI) and inflation. These control variables are essential for ensuring the robustness of the analysis and for isolating the specific effects of good governance on financial inclusion.

GDP per capita measures the average economic output per person. It is a critical indicator of economic development. A higher GDP per capita generally implies a higher standard of living, greater economic stability and increased access to resources. In the context of financial inclusion, a higher GDP per capita could lead to greater financial literacy, increased demand for financial services and more substantial investment in financial infrastructure. By including GDP per capita as a control variable, this study aims to account for the general level of economic development in India, which could influence the level of financial inclusion independently of governance factors.

FDI represents the investment made by foreign entities into the domestic economy. It plays a significant role in economic growth by bringing in capital, technology and expertise. In the context of financial inclusion, FDI can stimulate economic activity, create jobs and increase income levels, all of which can lead to a greater need for and access to financial services. Additionally, FDI can encourage the development of financial institutions and infrastructure, thus promoting financial inclusion. By controlling for FDI, this study accounts for the influence of foreign investments on financial inclusion, ensuring that the effects of good governance are not conflated with the benefits brought by foreign capital.

Inflation, the rate at which the general price level of goods and services rises, is another critical macroeconomic variable that can impact financial inclusion. High inflation can erode the value of money, reduce purchasing power and increase uncertainty in the economy. This could lead to a decrease in savings and investment, thereby affecting the demand for financial services. On the other hand, moderate inflation indicates the macroeconomic stability of an economy, which is often associated with economic growth and can lead to increased financial activity. By including inflation as a control variable, this study aims to isolate the impact of governance on financial inclusion from the effects of price level changes in the economy.

By incorporating these control variables- GDP per capita, FDI, and inflation this study ensures a more comprehensive and accurate analysis of the relationship between good governance and financial inclusion in India. The inclusion of these variables allows for a clearer understanding of how governance specifically

influences financial inclusion, beyond the general economic conditions and external investments that also play a role in this process. All the considered variables are used in their log form for further analysis.

III. ESTIMATION TECHNIQUE

a) *Pre-Estimation Tests*

Before estimating the model, several pre-estimation tests are conducted to ensure the robustness and reliability of the selected econometric model. These tests help in understanding the characteristics of the data and verifying the appropriateness of the ARDL model for analysis.

The first step involves examining the descriptive statistics of the variables to understand their fundamental properties, such as mean, standard deviation, skewness and kurtosis. This provides insights into the distributional characteristics of the data. Additionally, a correlation matrix is constructed to assess the degree of association between the variables, helping to identify potential multicollinearity issues that may affect the model's performance.

Since time-series data is often characterised by trends and non-stationary behaviour, it is crucial to determine the stationarity of the variables before proceeding with model estimation. The order of integration of the variables, which refers to the number of times a series needs to be differenced to achieve stationarity, must be established.

To Determine the Order of Integration, the Study Employs Two Widely used Unit Root Tests: The Augmented Dickey-Fuller (ADF) Test (Dickey & Fuller, 1979) to examine the presence of a unit root in the data and determine whether the series is stationary or requires differencing. Phillips-Perron (PP) Test (Phillips & Perron, 1988). This test extends the ADF test by adjusting for heteroskedasticity and autocorrelation, making it a robust alternative for detecting unit roots.

Both tests are applied to each variable at levels and first differences to classify them as either stationary at level $I(0)$ or stationary after differencing $I(1)$. The ARDL model requires that variables be either $I(0)$ or $I(1)$, but not $I(2)$, ensuring that the model is appropriately specified.

b) *Estimation Test*

Once the stationarity tests confirm that the variables exhibit a mixed order of integration, some being $I(0)$ and others $I(1)$, the ARDL model can be appropriately specified. The ARDL approach to cointegration is particularly advantageous as it allows for the estimation of relationships among variables with different integration properties, making it a robust method for analysing both short-run and long-run dynamics.

One of the key strengths of the ARDL model is its flexibility; it can be applied regardless of whether the



variables are purely I (0), purely I (1), or a combination of both. This makes it a versatile tool for examining the long-run and short-run interactions between financial inclusion and governance indicators in India. The ARDL

model, as specified in Equation (4), determines the optimal number of lags for the variables, facilitating an in-depth analysis of the long-term relationship between financial inclusion and good governance.

$$\begin{aligned} \Delta \ln FII_t = & \alpha_0 + \lambda_1 \ln FII_{t-1} + \lambda_2 \ln CC_{t-1} + \lambda_3 \ln GE_{t-1} + \lambda_4 \ln PS_{t-1} + \lambda_5 \ln RQ_{t-1} + \lambda_6 \ln RO_{t-1} + \\ & \lambda_7 \ln VA_{t-1} + \lambda_8 \ln GDPPC_{t-1} + \lambda_9 \ln FDI_{t-1} + \lambda_{10} \ln IN_{t-1} + \sum_{i=1}^{p-1} \beta_{1j} \Delta \ln FII_{t-i} + \\ & \sum_{j=0}^{q_1-1} \beta_{2j} \Delta \ln CC_{t-j} + \sum_{j=0}^{q_2-1} \beta_{3j} \Delta \ln GE_{t-j} + \sum_{j=0}^{q_3-1} \beta_{4j} \Delta \ln PS_{t-j} + \sum_{j=0}^{q_4-1} \beta_{5j} \Delta \ln RQ_{t-j} + \sum_{j=0}^{q_5-1} \beta_{6j} \Delta \ln RO_{t-j} + \\ & \sum_{j=0}^{q_6-1} \beta_{7j} \Delta \ln VA_{t-j} + \sum_{j=0}^{q_7-1} \beta_{8j} \Delta \ln GDPPC_{t-j} + \sum_{j=0}^{q_8-1} \beta_{9j} \Delta \ln FDI_{t-j} + \sum_{j=0}^{q_9-1} \beta_{10j} \Delta \ln IN_{t-j} + e_t \end{aligned} \quad (4)$$

In this model, Δ denotes the difference operator, α is a constant term and $\lambda_1 - \lambda_{10}$ and $\beta_1 - \beta_{10}$ represent the long-term and short-term coefficients, respectively. The term e is the stochastic error term.

Equation (4) is considered to be cointegrated if there exists a long-term relationship among the variables $\ln FII$, $\ln CC$, $\ln GE$, $\ln PS$, $\ln RQ$, $\ln RO$, $\ln VA$, $\ln GDPPC$, $\ln FDI$ and $\ln IN$. The estimation process begins by testing for cointegration, which essentially means determining whether the variables move together over the long term.

Cointegration is established when the null hypothesis, which states that there is no long-term relationship ($H_0: \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = \lambda_6 = \lambda_7 = \lambda_8 = \lambda_9 = \lambda_{10} = 0$) is rejected. This rejection is based

on the F-statistic derived from the model. If the F-statistic falls below the lower-bound critical value for I(0) at a 5 per cent significance level, the null hypothesis cannot be rejected, indicating no cointegration. Conversely, if the F-statistic exceeds the upper-bound critical value for I (1) at a 5 per cent significance level, the null hypothesis is rejected, confirming cointegration. If the F-statistic lies between the critical values, the test result is inconclusive.

Once cointegration is confirmed, the next step is to estimate the Error-Correction Model (ECM). The ECM captures both short-run adjustments and the long-run equilibrium in response to any volatility in the variables, ensuring that the system eventually returns to equilibrium. This process is detailed in the following (5) equation.

$$\begin{aligned} \Delta \ln FII_t = & \alpha_0 + \sum_{i=1}^{p-1} \beta_{1j} \Delta \ln FII_{t-i} + \sum_{j=0}^{q_1-1} \beta_{2j} \Delta \ln CC_{t-j} + \sum_{j=0}^{q_2-1} \beta_{3j} \Delta \ln GE_{t-j} + \sum_{j=0}^{q_3-1} \beta_{4j} \Delta \ln PS_{t-j} + \\ & \sum_{j=0}^{q_4-1} \beta_{5j} \Delta \ln RQ_{t-j} + \sum_{j=0}^{q_5-1} \beta_{6j} \Delta \ln RO_{t-j} + \sum_{j=0}^{q_6-1} \beta_{7j} \Delta \ln VA_{t-j} + \sum_{j=0}^{q_7-1} \beta_{8j} \Delta \ln GDPPC_{t-j} + \\ & \sum_{j=0}^{q_8-1} \beta_{9j} \Delta \ln FDI_{t-j} + \sum_{j=0}^{q_9-1} \beta_{10j} \Delta \ln IN_{t-j} + \delta ECT_{t-1} + e_t \end{aligned} \quad (5)$$

In the equation (5), ECT_{t-1} represents the lagged error correction term derived from the cointegrating equation, with its coefficient δ indicating the speed of adjustment. This coefficient measures how quickly the system returns to its long-term equilibrium after short-term disturbances. For stability, the value of δ should be significant and it should lie between 0 and -1.

c) Post-Estimation Tests

After estimating the model, several post-estimation tests are conducted to assess the robustness and reliability of the results. These diagnostic tests help ensure the validity and stability of the estimated model.

To detect potential econometric issues, the Breusch-Pagan-Godfrey test is used to check for heteroskedasticity, while the Breusch-Godfrey LM test assesses autocorrelation in the residuals. The Jarque-Bera test is employed to examine whether the residuals follow a normal distribution. Additionally, model stability is verified using the Ramsey RESET test, along with the CUSUM and CUSUM of squares tests, which evaluate the structural stability of the estimated parameters over time.

Furthermore, to validate the long-run relationships obtained through the ARDL model, the study employs the Fully Modified Ordinary Least Squares (FMOLS) method (Phillips and Hansen, 1990) and Canonical Cointegration Regression (CCR) method (Park, 1992). These techniques provide robust estimates by addressing potential endogeneity and serial correlation issues, thereby enhancing the credibility of the long-run results.

IV. RESULTS AND DISCUSSIONS

This section begins with an overview of the summary statistics, which include descriptive statistics and a correlation matrix, as given in Table 3.

Table 3: Descriptive Statistics and Correlation Matrix of Selected Variables

	InFI	InCC	InGE	InPS	InRQ	InROL	InVA	InGDPPC	InFDI	InIN
Descriptive Statistics										
Mean	-1.42	3.74	3.99	2.68	3.67	4.02	4.09	7.03	0.27	1.64
Median	-1.29	3.76	3.99	2.70	3.71	4.01	4.10	7.02	0.41	1.73
Max.	-0.09	3.90	4.18	3.11	3.89	4.13	4.15	7.58	1.28	2.35
Mini.	-3.17	3.57	3.81	2.20	3.26	3.91	3.92	6.47	-0.74	0.82
S. D.	1.03	0.09	0.08	0.22	0.15	0.06	0.05	0.36	0.52	0.44
Ske.	-0.14	-0.29	0.23	-0.26	-0.94	0.46	-1.87	0.03	-0.24	-0.20
Kur.	1.50	1.99	2.87	2.41	3.36	2.22	6.51	1.65	2.14	1.77
J-Bera	2.52	1.47	0.26	0.67	4.04	1.57	28.58	1.96	1.05	1.80
Prob.	0.28	0.47	0.87	0.71	0.13	0.45	0.00	0.37	0.59	0.40
Correlation Matrix										
InFI	1.00									
InCC	-0.05	1.00								
InGE	0.52	0.30	1.00							
InPS	0.09	0.52	0.17	1.00						
InRQ	0.29	0.14	0.40	0.24	1.00					
InROL	-0.83	0.34	-0.50	0.00	-0.46	1.00				
InVA	-0.55	-0.29	-0.59	-0.50	-0.62	0.53	1.00			
InGDPPC	0.97	0.01	0.54	0.14	0.43	-0.84	-0.63	1.00		
InFDI	0.73	-0.13	0.48	-0.02	0.29	-0.58	-0.39	0.67	1.00	
InIN	-0.07	-0.14	0.14	-0.28	-0.27	0.03	0.02	-0.17	0.15	1.00

Source: Calculated by authors.

Table 3 provides insights into the distribution and relationships among the variables studied. The InFI displays significant variability, with the mean indicating generally low financial inclusion. Governance indicators, such as InCC and InGE, show less variability, reflecting their relative stability over time. Correlation analysis reveals a strong positive relationship between financial inclusion and both InGDPPC and InFDI, underscoring the importance of economic factors in promoting financial inclusion. However, some governance indicators, like InROL and InVA, are negatively correlated with financial inclusion, suggesting a complex relationship that may not always align with higher levels of financial inclusion. The results indicate that while economic growth and foreign investment are crucial for financial inclusion, the influence of governance indicators is more nuanced, warranting further exploration to fully understand their impact.

The stationarity of the variables in the study is tested by the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. The results of stationarity are given in Table 4.

Table 4: Results of the Stationarity Test

Variable	Augmented Dickey-Fuller				Phillips-Perron			
	Level		First Difference		Level		First Difference	
	Intercept	Intercept & Trend	Intercept	Intercept & Trend	Intercept	Intercept & Trend	Intercept	Intercept & Trend
InFII	-3.74**	0.36	-5.05***	-3.10	-0.19	-2.78	-6.17***	-6.00***
InCC	-2.07	-2.01	-5.38***	-5.39***	-2.23	-2.15	-5.36***	-5.41***
InGE	-1.95	-2.81	-6.41***	-6.39***	-2.00	-2.85	-6.39***	-6.39***
InPS	-2.66*	-2.72	-6.22***	-6.37***	-2.65*	-2.67	-6.78***	-8.77***
InRQ	-2.62	-2.39	-3.78***	-3.69**	-2.16	-2.46	-3.75***	-3.66**
InROL	-1.20	-3.76**	-4.85***	-4.73***	-1.03	-2.87	-5.07***	-4.90***
InVA	1.04	0.15	-3.66**	-4.01**	0.67	-0.30	-3.71**	-3.99**
InGDPPC	-0.32	-2.57	-4.78***	-4.71***	-0.31	-2.28	-4.78***	-4.71***
InFDI	-2.08	-2.23	-5.12***	-5.04***	-2.08	-2.23	-5.12***	-5.04***
InIN	-2.21	-2.02	-5.07***	-5.05***	-2.24	-2.05	-5.07***	-5.05***

Note: ***, ** and * represent significance at 1%, 5% and 10% levels, respectively.

Source: Calculated by authors.

The results of Table 4 indicate that for most variables, including the InFII, InCC and InGE, the null hypothesis of a unit root is rejected at the first difference level, indicating stationarity after differencing. Specifically, variables such as InFII, InCC and InGE are found to be stationary in their first differences under both the intercept and trend specifications. The variable InPS is stationary at the level under the intercept specification according to both tests. Other variables, like InRQ and InROL, also show stationarity after differencing, though

some, like InVA, are stationary only under certain test specifications. Similarly, InGDPPC, InFDI and InIN are stationary in their first differences. These findings suggest that the variables are integrated of order I(0) and I(1), supporting the use of the ARDL model that accommodates both I(0) and I(1) processes, for further analysis of the relationship between governance and financial inclusion. The results of the optimal lag selection criteria are given in Table 5.

Table 5: Lag Order Selection Criteria in Vector Autoregressive (VAR) Model

Lag	LogL	LR	FER	AIC	SC	HQ
0	203.94	NA	8.65e-20	-15.51	-15.02	-15.38
1	422.88	245.20	1.21e-23	-25.03*	-19.66	-23.54

Note: * Indicates lag order chosen by the AIC criterion.

Source: Calculated by authors.

Table 5 indicates that optimal lag selection criteria, including AIC, SC and HQ, favour the inclusion of one lag in the VAR model. Consequently, the VAR

model with one lag is deemed optimal based on the selection criteria. The results of the bound test for cointegration are presented in Table 6.

Table 6: Results of Bound Test

Test Statistic	Value	Signif.	I(0)	I(1)
F-Statistic	11.08	10%	1.8	2.8
K	9	5%	2.04	2.08
		2.5%	2.24	3.35
		1%	2.5	3.68

Source: Calculated by authors.

The results of Table 6 show an F-statistic value of 11.08, which exceeds the critical values for upper limit I(1) at various significance levels, indicating a significant cointegrating relationship among the variables at the 1 per cent level of significance. This suggests a long-term equilibrium relationship among the series, confirming

cointegration. The results of long-run coefficients and the error correction term are presented in Table 7.

Table 7: Results for Long-Run Coefficients and Error Correction Term

Dependent variable- FII			
Variable	Coefficient	Std. Error	t-statistic
Normalized Long-run Coefficients			
InCC	-1.22	0.43	-2.80**
InGE	0.15	0.29	0.53
InPS	0.26	0.15	1.74
InRQ	-0.81	0.17	-4.61*
InROL	0.50	0.75	0.66
InVA	0.42	0.68	0.61
InGDPPC	2.81	0.13	21.30*
InFDI	0.20	0.05	3.94*
InIN	0.08	0.04	1.96***
C	-19.02	5.82	-3.26**
Error Correction Model			
D(InCC)	-0.60	0.13	-4.42*
D(InPS)	0.04	0.04	0.98
D(InRQ)	-0.54	0.12	-4.25*
D(InVA)	-1.45	0.45	-3.18**
D(InGDPPC)	3.34	0.22	15.15*
D(InFDI)	0.22	0.02	7.71*
ECT _{t-1}	-0.54	0.09	-6.00*

Note: ***, ** and * represent significance at 1%, 5% and 10% levels, respectively

Source: Calculated by authors.

Table 7 shows the results of the long-run coefficients and the error correction term with the FII as the dependent variable. In the long-run analysis, several variables significantly affect financial inclusion. Notably, the coefficient for InCC is -1.22 with a t-statistic of -2.80, indicating a significant negative impact on financial inclusion. This suggests that better control of corruption is associated with improved financial inclusion. The InRQ also shows a significant negative effect with a coefficient of -0.81 and a t-statistic of -4.61, implying that a stronger rule of law may be linked to lower financial inclusion, possibly due to the complexity or barriers created by stringent regulations. Conversely, the coefficients for InGE, InPS and InROL are not statistically significant, indicating that these factors do not have a significant long-term impact on financial inclusion in this model. However, InFDI and InGDPPC show significant positive effects on financial inclusion in the long run.

In the short run, the coefficient of the error correction term (ECT_{t-1}) is -0.54 with a highly significant

t-statistic of -6.00, indicating rapid adjustment of the model to restore equilibrium after short-term deviations, reflecting strong and efficient correction mechanisms towards long-term financial inclusion. The coefficients for changes in Control of Corruption, Rule of Law and Political Stability also show significant short-term effects on financial inclusion, highlighting their roles in adjusting short-term fluctuations. However, InFDI and InGDPPC show significant positive effects on financial inclusion in the short run. Overall, the results suggest that while some governance indicators, like Control of Corruption and Rule of Law, have significant long-term impacts on financial inclusion, others, such as Government Effectiveness and Political Stability, do not. However, the economic variables InFDI and InGDPPC show significant positive effects on financial inclusion in the short run. The model effectively corrects deviations, ensuring that financial inclusion moves towards a long-term equilibrium. The results of model diagnostic tests are given in Table 8.

Table 8: Results of Model Diagnostic Tests

Test	Test Statistic	Conclusion
Jarque-Bera Test for Normality	JB = 0.84 (0.65)	Residuals are normally distributed
Breusch-Godfrey LM Test for Serial Correlation	F = 3.26 (0.10)	No serial correlation in residuals
Breusch-Pagan-Godfrey Test for Heteroscedasticity	F = 1.30 (0.36)	No heteroscedasticity in residuals
Ramsey RESET Test	F = 6.71 (0.08)	The model is correctly specified

Note: The p-value for the coefficients is in parentheses.

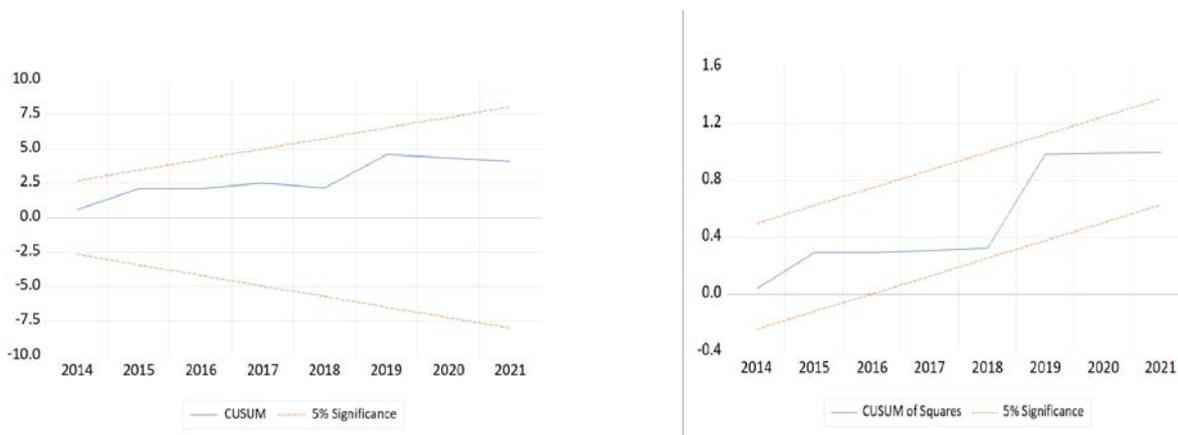
Source: Calculated by authors.

The results given in Table 8 indicate that the residuals are normally distributed, as evidenced by the Jarque-Bera test. The Breusch-Godfrey LM test for serial

correlation confirms no serial correlation in the residuals, suggesting that they are independent over time. The Breusch-Pagan-Godfrey test for heteroscedasticity

shows no evidence of heteroscedasticity, meaning that the variance of the residuals remains consistent across different levels of the independent variables. The Ramsey RESET test indicates that the model is correctly specified, affirming that the functional form of the model

is appropriate. These results suggest that the model is reliable, with no major issues in its residuals and that the estimates produced are likely valid. The results of the CUSUM and CUSUM of Squares tests are given in Figure 4.



Source: Constructed by authors.

Figure 4: Result of the CUSUM and CUSUM Square Test

The CUSUM test shows that the line remains within the 5% significance boundaries throughout the period from 2014 to 2021, indicating that the model's coefficients are stable over time. This stability suggests that the relationships between the variables have not significantly changed during the observed period. Similarly, the CUSUM of Squares test indicates that the variance of the residuals is stable over this period,

implying that the model is homoscedastic, with constant variance in its errors, a desirable property in time series analysis.

The model is re-estimated by FMOLS and CCR methods, addressing endogeneity and serial correlation issues to validate the ARDL model's long-term outcomes. The results of these methods are given in Table 9.

Table 9: Results of ARDL, FMOLS and CCR Methods

Variable	Dependent variable- FII		
	ARDL	FMOLS	CCR
InCC	-2.80**	-2.11**	-1.46
InGE	0.53	0.76	0.44
InPS	1.74	2.03**	2.09**
InRQ	-4.61*	-0.844*	-5.04*
InROL	0.66	0.44	-5.04*
InVA	0.61	1.58	1.10
InGDPPC	21.30*	22.66*	15.68*
InFDI	3.94*	3.66*	2.82**
InIN	1.96***	2.83**	2.27**
C	-3.26**	-4.28*	-2.74**

Note: ***, **and* represent significance at 1%, 5% and 10% levels, respectively.

Source: Calculated by authors.

The results given in Table 9 indicate that Control of Corruption shows a consistent negative impact on FII, with statistically significant coefficients in both the ARDL and FMOLS methods, though this effect weakens in the CCR method. Government Effectiveness does not demonstrate a strong influence on FII, as the coefficients across all methods are positive but not statistically significant. Political Stability, however, positively correlates with FII, with significant coefficients in the FMOLS and CCR methods. Regulatory Quality

exhibits a negative relationship with FII across all methods, with statistically significant results, particularly in the ARDL and CCR methods. The impact of the Rule of Law varies, with the CCR method showing a significant negative effect, contrasting with the non-significant results in ARDL and FMOLS. Voice and Accountability do not significantly affect FII in any method. Lagged GDP per capita consistently shows a strong positive relationship with current FII across all methods, indicating a momentum effect. Foreign Direct

Investment also has a positive and significant impact across all methods. Inflation is positively associated with FII, with significant coefficients in the ARDL, FMOLS and CCR methods.

Results show that estimates from these techniques closely align in signs and magnitudes with ARDL model results, ensuring the robustness of the estimates. Consistency across estimation techniques strengthens confidence in the reliability of the ARDL model.

The results indicate that financial inclusion in the studied context is strongly influenced by economic factors such as GDP per capita and foreign direct investment, which are both positively correlated with financial inclusion. However, the impact of governance indicators is more complex. While better control of corruption appears to enhance financial inclusion, other governance factors like the rule of law may have a negative or nuanced effect.

V. CONCLUSION

The study offers a nuanced exploration of the impact of good governance on financial inclusion in India, integrating a range of econometric methods to provide a comprehensive analysis of both long-term and short-term relationships. The descriptive statistics reveal substantial variability in the Financial Inclusion Index, highlighting generally low levels of financial inclusion across the board. In contrast, governance indicators such as Control of Corruption and Government Effectiveness show relative stability, reflecting their consistent nature over time. The correlation analysis underscores a strong positive relationship between financial inclusion and economic factors, specifically GDP per capita and Foreign Direct Investment, indicating that economic growth and foreign investment are crucial drivers of financial inclusion. However, some governance indicators, such as Rule of Law and Voice and Accountability, exhibit negative correlations with financial inclusion, suggesting that their impact is more complex and may not always align with increased financial inclusion.

The study tested the stationarity of the variables through the Augmented Dickey-Fuller and Phillips-Perron tests. The results indicate that the variables are integrated of order $I(0)$ and $I(1)$. This finding supports the application of the ARDL model that can handle variables which are both $I(0)$ and $I(1)$. Model selection criteria, including AIC, SC and HQ, suggest that a VAR model with one lag is optimal, as evidenced by improved LogL and LR statistics. The bound test for cointegration reveals a significant cointegrating relationship among the variables, indicating a long-term equilibrium. The long-run analysis demonstrates that Control of Corruption and the Rule of Law have significant negative effects on financial inclusion, while

FDI and GDPPC have a significant positive impact. The short-run analysis shows that deviations from equilibrium are corrected rapidly, with significant short-term effects from governance indicators like Control of Corruption and Rule of Law. Similarly, the economic variables \ln FDI and \ln GDPPC show significant positive effects on financial inclusion in the short run.

Model diagnostics affirm the reliability of the results. Tests for normality, serial correlation, heteroscedasticity and model specification suggest that the residuals are normally distributed, free of serial correlation and heteroscedasticity and that the model is correctly specified. The stability of the model is further supported by the CUSUM tests, indicating that the model's coefficients and residual variance remain stable over the observed period. Robustness checks using ARDL, FMOLS and CCR methods reveal the robustness of the models.

In conclusion, this study provides a comprehensive analysis of the interplay between good governance and financial inclusion in India, using robust econometric methods to uncover both long- and short-term dynamics. While economic factors like GDP per capita and FDI significantly enhance financial inclusion, governance indicators such as Control of Corruption and Rule of Law exhibit more complex, sometimes negative effects. The findings highlight the nuanced role of governance in financial inclusion, with both equilibrium corrections and stability tests confirming the model's reliability. Overall, the study underscores the importance of balancing economic growth and governance reforms to drive inclusive financial development. Finally, further research is needed to delve into specific mechanisms through which governance affects financial inclusion, providing deeper insights for targeted policy interventions. Implementing a balanced approach that integrates economic and governance factors will be crucial for advancing financial inclusion and promoting broader economic development in India.

Authors' Contributions

All authors contributed equally to this research. Professor C. R. Bishnoi conceived the idea and provided guidance, while Ayushi Vashistha and Ashi Jain developed the conceptual framework, designed the methodology and co-authored the manuscript with his input.

Conflict of Interest

The authors affirm that they have no affiliations with or involvement in any organisation or entity that holds financial or non-financial interests in the subject matter or materials presented in this manuscript.

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Fifty Years of Italian Personal Income Tax

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FIFTY YEARS OF ITALIAN PERSONAL INCOME TAX

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Fifty Years of Italian Personal Income Tax

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INTRODUCTION

About fifty years ago, Italy had a lower tax burden than countries like France, Germany, and the United Kingdom, not to mention the Scandinavian countries. However, it had a higher one than Spain and other Mediterranean countries; indeed, the direct relationship between per capita GDP and tax burden has often been noted. What negatively affected our country was the low level of direct taxes as a proportion of the total, just over a fifth. In particular, a personal income tax, characteristic of European and Anglo-Saxon countries, was absent. The main direct tax¹ the tax hit each individual income separately with different rates, both for individual and societies. There was a progressive tax² that affected a relatively limited number of higher income earners and generated a significantly lower revenue.

On 1971 a general reform established two taxes, *Impostasul Reddito delle Persone Fisiche* (IRPEF), a personal income tax, and *Impostasul Reddito delle Persone Giuridiche* (IRPEG), a corporate income tax; according to European agreements, a value-added tax was introduced, in the place of an indirect tax on sales which was a cumulative cascade tax like the US sales tax.

IRPEF was originally introduced with 32 brackets; the first one with a rate of 10 percent up to 2 million lire³, and the last rate (72 percent) for incomes exceeding 500 million lire. The rather high progressivity is due (almost) entirely to the structure of brackets and

relative rates; deductions and tax credits were extremely limited. As we will see, the initial structure of the tax was completely different from the current one.

The model on which IRPEF was inspired was the Comprehensive Income Tax (CIT) developed by two American economists, Robert Haig (1921) and Henry Simons (1938), preceded by the German Georg von Schanz (1896). The CIT considers income to be the sum of consumption plus the net variation in assets in the period (year) considered. Therefore, not only the remuneration of workers and the profit from business or professional activities (produced income) is considered income, but any sum that enters the subject's availability and may be used for consumption or capital increases. In the 1960s, the CIT was the theoretical model of reference, particularly in the Anglo-Saxon world; it should be remembered that in Italy economists, like Luigi Einaudi, were ardent supporters of the exemption of savings from tax.

a) IRPEF Leakages from Capital

IRPEF immediately deviates from CIT by excluding all financial income, which should be included as revenue from capital. The reason was due to risk of capital flight, but, after two years, the political world realized⁴ that large business owners (like Agnelli's family with FIAT) and small owners of a few shares paid the same percentage of tax, 30 percent on dividends.

The most logical solution was to include the dividend in the IRPEF tax base, with a tax credit that offset amount already paid in IRPEG, so that each shareholder would pay according to their overall income and therefore corresponding marginal tax rate. Moreover, ordinary shares are registered, and consequently there were no risks of. Thus in 1978 (Pandolfi law) dividends from ordinary shares became part of IRPEF. However, in the following decades, presence of these capital incomes gradually disappeared; from 2017 all dividends are taxed with the same rate of 26 percent, the same applied to all income from financial activities.

While in the case of revenue from financial assets there is a legal exemption from IRPEF, in the case of income from real estate and land, however, it is better to use the term "erosion", meaning that values to be declared in IRPEF are lower than the market ones. In

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¹ *Imposta di Ricchezza Mobile* (Mobile Wealth Tax).

² *Imposta Complementare* (Complementary Tax).

³ At the end of 1998 the euro-lira exchange rate was set at 1936.27 lire for one euro.

⁴ How this happened is worth telling. The law established that the list of taxpayers, resident in each area, was to be displayed in the municipal offices; when this happened, the first to consult the lists were, obviously, journalists. They discovered, with some surprise, that well-known car manufacturer, like Gianni Agnelli, was not at the top of the list in Turin, nor Alberto Pirelli, car tires and cables, in Milan.

the case of land, income was determined by the specific land registry, which determined land and agricultural income. This income, which was not updated, was generally lower than the actual income. A similar argument applies to cadastral income from real estate, which had to be declared by the owners when they themselves used the property. Residential apartments also had a deduction, which had grown over the years to the point of limiting the number of residents still paying the tax to less than 20%. In 2000, cadastral income became formally exempt for all taxpayers.

Eight years later, Berlusconi's government extended the local property tax exemption to residential apartments⁵, except most luxurious ones (a very small percentage of the total). Monti's government re-introduced the tax but subsequent Renzi's government again confirmed the exemption. Italy is at present one of the few countries in the world and it is the only one in Europe to exempt a great part of apartments, so that the burden of property tax hits all other properties more severely. It is easy to explain why politicians of different orientations grant the exemption for first home: percentage of apartment owners in Italy is very high (around 80%). This high percentage depends to a large extent on the severe shortage of public housing.

Income from non-residential properties and rental housing, to be declared in IRPEF, in the early 2000s, was a rather small amount. But since 2011, there has been an option for a flat-rate tax of 21 percent (reduced to 10 percent in case of popular housing); the option also includes elimination of registration and stamp duty. The flat-rate tax option, with rate 21 percent, from 2019 has also been extended to instrumental leases, in case of shops and stores with a surface area no greater than 600 square meters.

In conclusion only a smaller part of revenue from real estate properties remains to be declared in IRPEF; as Vincenzo Visco⁶ (1984) stated, "IRPEF is certainly not a general tax on income, but rather takes on the characteristics of a special tax on certain incomes, in particular on incomes from employment and pensions". These words may even be considered too harsh compared to what happened after the first ten years of the tax.

In conclusion it can be said that IRPEF is very far from the CIT model; it is not a condemnation as such, as there is an alternative model, that of the dual system, as we will see later, where capital income is subject to a separate tax.

b) *IRPEF Work's Leakages*

In a dual system the personal income tax personal income tax should include all earnings from

work; in the last ten years we have witnessed the progressive exodus of self-employed workers from the personal income tax. The introduction of the flat-rate system for VAT-registered individuals has allowed a greater part of them⁷ to opt for a separate flat tax.

It is interesting to note how an institution originally born to facilitate the start-up and early years of small individual businesses, especially among professionals, has evolved into an alternative tax system for almost two million self-employed people. In 2008 Prodi's government introduced the minimum tax regime for young people eager to start a business (with a VAT number); the regime was valid until the age of 35⁸. Essentially, it was a transitional regime, after which self-employed workers would revert to personal income tax (IRPEF).

Revenue could not exceed €30,000 euro, and purchases of capital goods in last three years of operation could not exceed €15,000. It was not allowed to have employees. Taxable income was determined as the difference between documented revenues and costs (like regular income tax); VAT was not required, while the substitute rate for income tax (IRPEF) and regional production tax (IRAP), initially set at 20%, was subsequently reduced to 5% in 2011 (due to the supervening financial crisis).

With the 2016 Stability Law, the "small operator regime" changed its name to the "flat-rate regime"; more importantly, its nature changed, becoming a permanent option for VAT-registered individuals (with the option to revert to the IRPEF regime after three years). The takings limit was raised to €65,000; the investment limit was eliminated, and was introduced the possibility to employ collaborators up to a cost of €20,000. The tax rate remains at 5% for the first five years, then increases to 15%. The nature of the transition from revenue to taxable income also changes: while under the minimum tax regime it was determined by deducting actual costs incurred, under the flat-rate regime it is established with percentages according to ISTAT classification⁹, with percentages ranging from 40% for wholesale or retail trade, to 78% for professions, and 86% for construction and real estate activities. Therefore, deductions for costs (such as those for collaborators) are not allowed, other than social security contributions. With the 2023 Budget Law¹⁰ the revenue limit was raised to €85,000.

The aim of the parties (above all Lega) in the current government is to apply the flat tax to all self-employed workers; the next step is that of rising revenue limit to €100,000. In 2015 the purpose was that of

⁷ In the 2023 tax return, 54 percent of more than 3.5 million self-employed workers.

⁸ With the exception of employees undergoing redundancy, but in this case the regime was only valid for five years.

⁹ Classification of economic activities ATECO Code.

¹⁰ Meloni's government first budget law.

⁵ So called "prima casa" (first home).

⁶ Future Minister of Finance in 1996 Prodi's government and Deputy Minister of Economy and Finance in 2006 Prodi's government.

encouraging the growth of self-employed, by offering permanent tax relief (provided that revenues remained within the established limit). Subsequent measures tended to implement the flat tax, with the aim of extending flat tax method to all economic operators (natural persons), as alternative to the progressive tax. Italy would be the first western European country to follow the proposal formulated by Milton Friedman (1962) and developed by Robert Hall and Alvin Rabushka (1981). Indeed, in 2023, before the revenue limit was raised to €85,000, almost 2 million tax payers have chosen the flat-rate regime.

Even some employee wages are taxed at fixed rates; in fact, the high marginal rates (as we will see later) make it make it convenient for both workers and employers to have the sums taxed outside personal income tax. For employees, from 2008, for incentive target, first with reference to overtime and subsequently (2016) with company and territorial productivity bonus agreements, a flat rate tax was established, with a rate of 10% and from 2023 at 5%, for variable amount of performance bonuses; in theory, although the controls are not easy, payments are linked to "increases in productivity, efficiency and innovation". According to recent data from the Ministry of Labor, over 5 million workers currently benefit from bonuses, for total of approximately 7.5 billion. The sum is a relatively modest one, so that the Meloni's government is considering applying the flat tax to wage increases, thus making a significant step forward towards the flat tax; the only obstacle is the high cost of the measure.

c) *Evasion*

Italy has been always characterized by tax evasion, as a country where the productive structure is composed by a high number of small businesses; according the National Institute of Statistics (ISTAT 2024) the average number of employees is 3.9. Self-employed workers make up 27.1% of the total (almost doubling the European rate 15.9), percentage rising to 33.8 in Southern Italy. This fragmentation of production, combined with a centuries-old history of foreign domination, explains the high rate of evasion, distributed according to south-north gradient. The Report of Minister of Economic and Finance on the unobserved economy and on tax and social security evasion (2024) presents the weight on the added value of the unobserved economy by region: the highest percentages are found in the Southern Regions (led by Calabria with 19.2%), followed by those in the Centre, and finally those in the North (last being the Autonomous Province of Bolzano with 8%).

Regarding the personal income tax (Table III.1.1.1), evasion rates are obviously particularly high in the business and professional sectors, with a total value of 29.6 billion (something less than 33.3 billion in 2017). Compared to the potential tax and GDP, the

percentages are 66.8 and 1.6 respectively. One might wonder whether the widespread use of the flat-rate regime has played a role in the 11 percent drop in evasion over the last seven years; the reduction in the burden of personal income tax, which is achieved by opting for the flat-rate regime, may have led to an increase in compliance, but since many operators have aimed to stay within the revenue limits (€85,000), there has been an inverse effect, increasing evasion.

d) *Tax Progressivity*

At the time of the 1973 reform, the tax burden¹¹ in Italy was about fifteen percentage points lower than that of countries like France, Germany, and the United Kingdom, and more than twenty percentage points lower than that of Scandinavian countries; after about twenty years, the gap had essentially closed, mainly thanks to the personal income tax (IRPEF).

Table 1: Tax Burden in Relation to GDP

	1975		1995	
	Direct	Total	Direct	Total
France	5,6	35,4	7	42,9
Germany ¹²	11,8	34,4	11,3	37,2
Italy	5,4	25,4	14,2	40,1
Spain	4,1	18,4	9,4	32,1
Sweden	20,2	52,7	18,9	48,1
U.K	15,8	35,3	12,8	34,7

The reason depends on the increasing elasticity of the tax (that is the ratio between marginal and average tax rate, also known as liability progression), which will be described now.

The overall level of progressivity is calculated by the Kakwani index, as difference between Gini index (which measures income inequality) and Tax Concentration Index, that is Gini index of tax distribution. The redistributive effect (Reynolds-Smolensky index) depends both on the value of the Kakwani index and on the weight of the income tax. According to Baldini (2020) redistributive effect in forty years has increased by 70.8¹³; this strong increase is mainly due to the increase of the incidence of the tax¹⁴ (58.6 percent) and only to a lesser extent to the greater progressivity (9.9 percent).

However, the nature of the tax's progressivity has completely changed over the past four decades. Initially, progressivity depended on tax brackets, while tax credits were very limited. Progressivity was therefore based on increasing tax rates; the ones that really mattered were the first ten brackets (rates 10-32), where 99 percent of taxpayers fell. Tax elasticity was on average 1,3.

¹¹ Direct and indirect taxation plus social contributions.

¹² West Germany.

¹³ From 0,0253 to 0,0432.

¹⁴ That is the ratio of total tax revenue to GDP.

Nowadays things have changed profoundly; according to a statistical analysis (Barbetta et al. 2018), more than half of the total PIT redistributive effect is due to the two most important tax credits (the tax credit for employment and the tax credit for retired people), while the marginal rates schedule contribution is about 40 percent. On the contrary, most of the itemized expenditures do not show any sizable impact on redistribution.

To explain this change in the factors influencing progressivity, we need to look at the inflationary process of the 1970s and early 1980s. The increase in IRPEF burden in two decades of the 70s and

80s derives from the strong inflationary process and the high elasticity of the tax, producing a continuous process of bracket creeping. From 1973 to 1981 the annual rate of increase in prices was almost 17 (16,95) percent. In 1982, Prof. Bruno Visentini, a tax law scholar and Minister of Finance, carried out a transformation of IRPEF, reducing from 32 brackets to 9, raising the first one to 18, and reducing the last one to 65 percent.

The effect of the intervention on the tax brackets can be seen in Fig. 1, where on a large scale, the intervention consists of an almost uniform reduction in the tax rates.

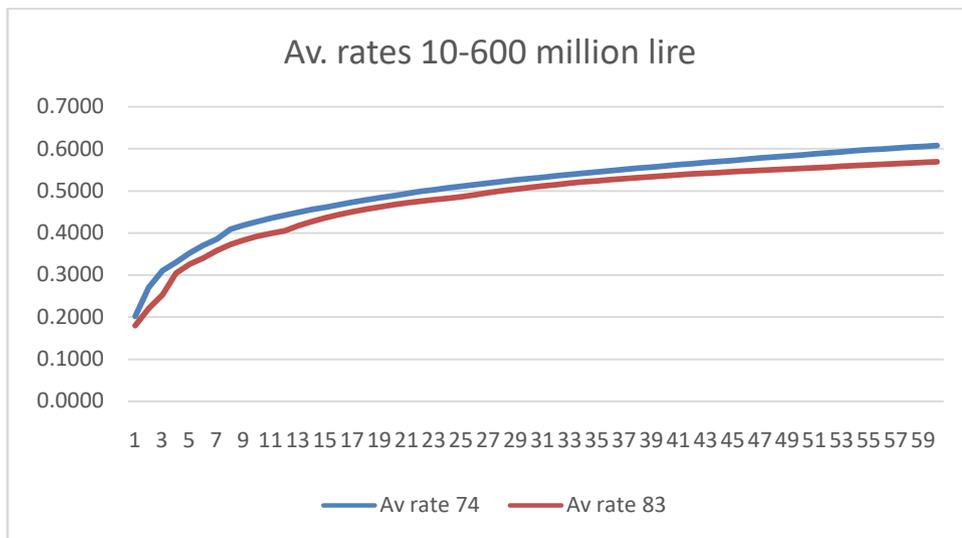


Fig. 1: Brackets and Rates 1974-1983

Visentini also introduced tax credits that were reduced in steps up to 16 million for employed workers and pensioners. Zooming in on low incomes, in fig. 2 we can see that the intervention aims to protect workers

and pensioners with the lowest incomes. Due to budget constraints, it does make sense to try to protect the poorest.

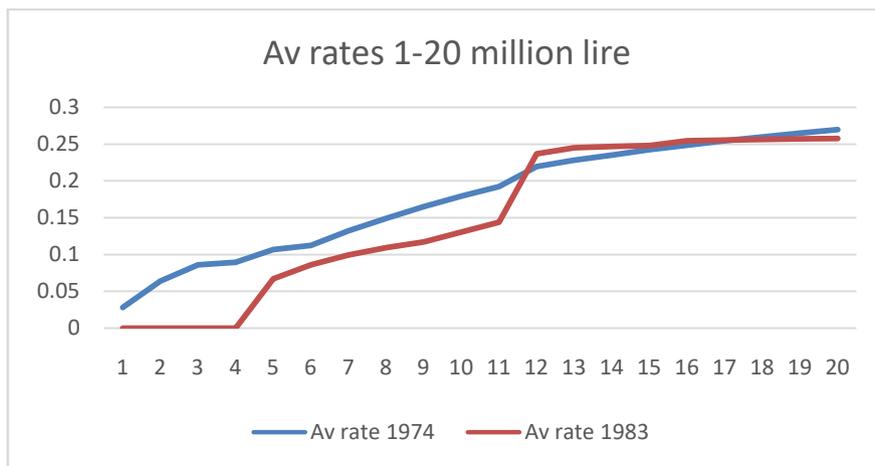


Fig. 2: Role of Tax Credits

The main aspects in the following twenty years are two: I) tax brackets are reduced from 9 to 5, with the top rate dropping from 65% to 45%; II) the system of degressive tax credits is made more complex. In

2001 (last Prodi's law) the steps increased to twenty¹⁵, with a significant tax credit increase (1,147 euro). It

¹⁵ Twelve for self-employed.

remains fixed up to revenue 6,197, then it halves (578), with ten steps, to 9,813¹⁶; from 6,300 to 8.400 tax elasticity is on average 7.8, with deep oscillations.

The philosophy behind the intervention is always based on protecting and even supporting lower incomes; moreover, the budgetary costs made it impossible to completely eliminate the effects of inflation on average tax rates. Criticism of high marginal tax rates had led to a sharp reduction in the highest rates, even maintaining the idea of tax progressivity. In this way highest income earners get a benefit, while the middle classes had an increase in tax burden; the elasticity can be seen in fig. 3 below. However, compared to the formal rate of 18 percent of the first bracket, workers (who benefit an increase in their wage) could have a high probability of a reduction of the tax credit; so, depending on the increase in income, they could add an implicit marginal rate of 15 points or even more. From 9,813 to 51,646 probability of an implicit rate decreases because the intervals between one step and the next increase.

In this way, the new tax credit system increases the redistributive effect, despite the elimination of the highest marginal rates, because, next to official rates of the five brackets, we have to add implicit marginal rates due to decreasing steps. As we shall see, this paved the way for a continuous increase in tax elasticity.

e) *Implicit Marginal Rates*

In 2003, the first phase of the Berlusconi government's reform came into force, with the declared ultimate goal of applying a flat tax to almost all (99%) taxpayers (with incomes up to 100,000 euros). Initially, however, the tax brackets and rates remained five, with the first two (which affected the majority of taxpayers) increasing from 18 to 23 and from 24 to 29 percent. A main innovation was the introduction of decreasing deductions from income, with a continuous formula and no longer in steps.

Taxable income (R_i) is generally defined as the remuneration for work (Y) minus the taxpayer's actual deduction (De):

$$R_i = Y - De. \tag{1}$$

The actual deduction, in turn, is calculated using the following formula:

$$De = D_i * (26,000 + D_i - Y) / 26,000 \tag{2}$$

D_i is equal to 7,500 for employees, 7,000 for pensioners, 4,500 for the self-employed (businesses and professions), and 3,000 for pure rentiers. Looking at the formula, we note that the applicable deductions exempt from tax up to 7,500 and end at 33,500 for

employees, exempt up to 7,000 and end at 33,000 for pensioners, and so on.

From (1) and (2) we get:

$$R_i = Y - D_i * (26,000 + D_i - Y) / 26,000 \tag{3}$$

Looking at (3) we note that an increase in Y of 100 euros determines has a greater effect on disposable income (R_i), equal to 128.85 for employed workers, 126.92 for pensioners, 117.31 for self-employed workers and 111.54 for rentiers; to these increases is applied the tax rate of the bracket. But the identical result can be obtained by multiplying the formal rate by $D_i/26,000$ and applying the result to the increase in Y . Thus, considering the first bracket, the marginal tax rate of the employed worker goes from 23 to 29.63, that of the pensioner from 23 to 29.19 percent. One could outline, alongside the structure with formal rates and decreasing deductions, a structure with fixed deductions for all (differentiated by category) and increased tax credit of 1,2885 (employees), 1,2692 (pensioners), and 1,1731 (self-employed). The results, in terms of net tax, are identical (Libro Bianco 2008) and they make explicit what might not seem so: that the true marginal rates have increased. The deduction certainly reduces the average rate, but, given its decreasing nature, it increases the marginal rate.

The lack of full awareness of new system implications can be seen in the lack of coordination between the limits of the brackets and those of deductions; the consequence is that the elasticity of the tax, in addition to increasing for low and medium incomes, presents significant oscillations, as it can be seen in the following Fig. 3. Overall, the elasticity of the tax, which measures the progressivity of the incomes involved, increases significantly.

Another news is the different treatment of employees and pensioners who previously received the same tax credits. The difference is certainly small, but, as we'll see, it will tend to increase in subsequent years.

In 2006 the second phase of tax reform reduced from five to four the brackets cutting the highest rate by two points¹⁷, and extending the first bracket limit from 15,000 to 26,000. In this way, low-middle and high-income taxpayers received a noticeable tax reduction, while, for those between 26,000 and 70,000, the reduction was symbolic.

Deductions for spouses and children are also made degressive with respect to income, unlike tax credits which were fixed. Further implicit marginal rates were then added to those introduced with first phase; even in this case average rates fell and marginal ones rose, determining an increase in tax elasticity.

¹⁶ From 9,813 tax credits decrease more slowly up to 51,646 with a remaining credit of 50.

¹⁷ Since 2005, the 43% rate has remained unchanged, making it one of the lowest rates in Western European countries.

The 2007 Prodi government went back to five brackets, similar to Berlusconi's first phase (2003), but leaving the highest rate at 43%. However, the new bracket structure resulted in a tax increase for all taxpayers; an increase of 2,490, peaking at 101,000 and then remaining constant.

The tax increase was offset for employees up to approximately 40,000, and slightly less for pensioners and self-employed workers. Deductions were replaced by tax credits, these too declining. The shift from deductions to tax credits made the implicit marginal tax rates more evident; for example, for employees in the first bracket (up to 15,000), the effective rate is 23 (formal rate) plus 7.14, since the credit is reduced by 7.14 every 100. In the second bracket (up to 28,000), we have 27 + 3.34, and in the third (up to 55,000) 38 plus 3.34; in both cases, the credit is reduced by 3.34 euros for every 100. The effective rates¹⁸ were 30,17 (I bracket), 30,34 (II bracket), 41,34% (III bracket), 41% (IV bracket), 43% (V bracket).

So even though there were formally five brackets, *de facto* one could say that for employees there were three brackets and rates. The tax credits determine, until they are cancelled at 55,000, an elasticity of the tax stronger than that determined by bracket rates.

¹⁸ A similar conclusion applies to pensioners. Note that the fourth bracket had a slightly lower rate than the third, which is not entirely appropriate.

In fig. 3 Three Elasticities 2001-2003-2007 are Compared:

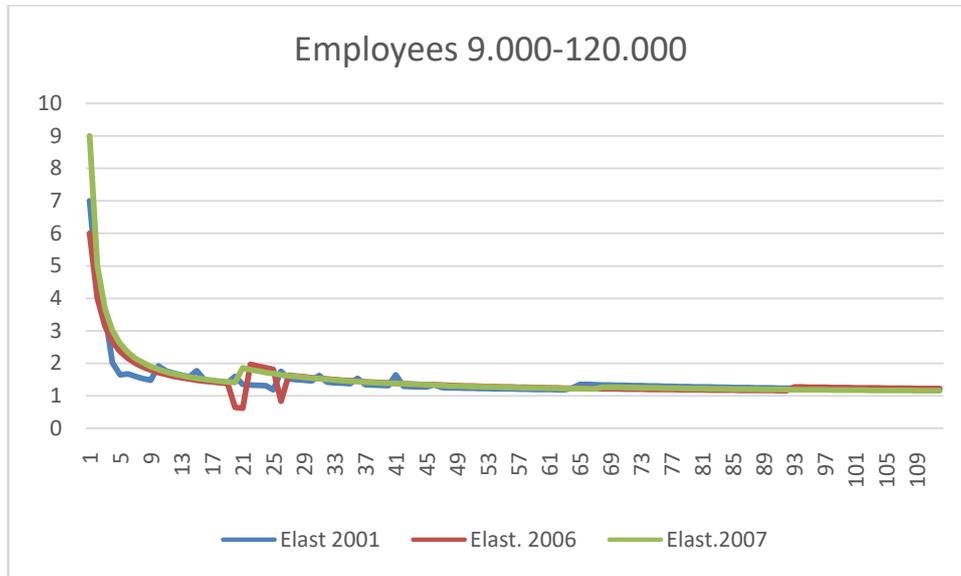


Fig. 3: Elasticities 2001-2007

Apart from some fluctuations, due to the tax credit steps in 2001, and the flaw¹⁹ in the 2003 tax, the elasticities²⁰ are substantially overlapping.

Tax credits for spouses and children also reinforce the elasticity effect. In the following years IRPEF remained substantially stable, with slight increases in tax credits (resulting in a further increase in elasticity); this explains why more than half of IRPEF redistributive effect is due to the tax credits (Barbetta et al. 2018).

f) *The Last Ten Years*

In 2014, Renzi's government introduced the "80 euro" bonus. Renzi had two objectives: The first goal was, for those receiving the bonus, to be able to see it on their monthly paycheck; the second was that the bonus was to be considered as a tax reduction rather than an increase in spending. To achieve this second objective, it was established that the bonus would be due, to those with a positive IRPEF (even just one euro) calculating the tax only with reference to the earned income. This was the case for a taxable income of at least €8,148, which triggered the bonus in full (if the individual had worked for the entire year). However, Eurostat-Istat noted that, in this way, the bonus cannot be considered a lower tax, but rather a transfer expense (hence an increase in public spending).

The cost budget, set at ten billion, imposed a limit on the bonus; here too, the preference was to ensure that the largest possible number of recipients received the full bonus; the result was that of imposing a very high implicit tax rate. The bonus is reduced to zero

within the space of two thousand euros between 24,000 and 26,000, decreasing by 48 every 100. Adding the formal rate of 27 and the implicit rate of 4.51 of tax credit, the effective marginal tax rate, over the 2,000 range²¹, ended up being 79.51 percent. More than a million workers, each year, who had received the bonus had to repay part (or even all) of it to the Revenue Agency.

A first attempt to resolve the anomaly occurred with the Conte²² government (2020), when the bonus was transformed, for incomes from 28,000 to 40,000 into a new decreasing tax credit, adding to the previous one for employed workers. The 79.51 rate was indeed eliminated, but in the third bracket two new rates appeared (because of the new decreasing tax credit), 45.05 percent from 28001 to 35000, and 60.82 percent from 35,001 to 40,000; both rates were higher than the two rates of the fourth and fifth brackets (41 and 43); the anomaly had just been moved forward.

The problem was addressed by the Draghi government in 2022, reducing the tax brackets to four (eliminating the 55,001–75,000 bracket with a rate of 41%), and cutting the rates of the second bracket by two points (from 27 to 25) and the third by three points (from 38 to 35). To reduce the advantage²³ to those with incomes above 55,000, the limit for the third bracket was brought forward to 50,000. Furthermore, the tax credit for employees (which the Letta government had raised

¹⁹ From 29,000 to 34,000.

²⁰ Both drop below 1.5 after 40,000.

²¹ Later moved from €24,600 to €26,600, which did not change the nature of the problem.

²² Called Conte 2, because the new government, with the same prime minister, was supported by the Democratic Party and not by the League (this party supported Conte 1, 2018-2019).

²³ Reduction from 960 to 270.

from 1840 to 1880) was kept fixed up to 15,000, and the Renzi bonus was also limited to that income; From 15,001 it becomes a further tax credit which thus rises to 3,100, decreasing to 1,910 at 28,000 (with an implicit rate of 9.15) and finally reaching zero at 50,000 (with an implicit rate of 8.68). In this way, the slowing down of formal rates (second and third brackets), was compensated by the increase in the implicit rates due to the decreasing tax credits.

The IRPEF structure thus takes on a more regular form; the effective rate of the third bracket (28,000-50,000), equal to 43.68 (35+8.68), is slightly higher than that of the fourth (43); apart from this defect, one could speak of a three-brackets system, with the third starting at 28,001. However, the elasticity of the tax increases for low-middle income workers, being 13.85 at 15,000 and still 2at 29,000; it then drops to 1.39 at 50,000.

It happens that the two-year period 2022-23 was characterized by a high level of inflation (almost absent for many years), which in Italy determined, in the two-year period, a price increase of 15.1 percent. The sharp rise in the average rate determines an increase in tax pressure, leading Meloni's government to intervene by lowering the tax burden on low-middle income workers, thus also benefiting employers. It was clear that action had to be taken to balance the phenomenon of bracket creeping, particularly strong on low and middle incomes; reducing the tax burden was a way of lowering the workers pressure on employers.

An initial intervention (2024 budget law) introduced a reduction, in social security contributions for workers, which ended at salary 35,000, for budgetary reasons. In this way once this threshold was exceeded, a loss of over 1,000 was incurred.

The next budget law (2025) introduces a significant change: the previously introduced relief on employee's contributions has been abolished and replaced by a new bonus, with three decreasing percentages: 7.1 up to 8,500, 5.3 up to 15,000, and 4.8 up to 20,000. This bonus too is considered a monetary transfer that accompanies, but is not formal part of, the tax structure, like the previous Renzi's bonus. Above 20,000, there is an additional tax credit of €1,000, which remains constant up to €32,000 and then decreases linearly to €40,000. This new tax credit solves the problem of the previous intervention; however, it is easy to understand that, within the second formal bracket, a new decreasing deduction with an implicit rate of 12.5 percent (1.000 in the space of 8.000) was added.

Therefore, in 2025, considering the personal tax plus the two bonuses, brackets and rates (of which the first is negative) for employed workers are not three but eight (with the first rate negative):

Table 2: Effective Brackets to Employees

Tax Brackets	Rates
-8,500	-7.1
8,501-15,000	17.7
15,001-20,000	27.35
20,001-28,000	32.15
28,001-32,000	43.68
32,001-40,000	56.18
40,001-50,000	43.68
Over 50,000	43

As far as pensioners and self-employed workers are concerned, the situation has not changed since Draghi's intervention:

Table 3

Pensioners ²⁴	
Brackets	Rates
0-8,500	23
8,501 – 28,000	29,44
28,001-50,000	38,18
Over 50,000	43
Self employed ²⁵	
0-5,500	23
5,501 – 28,000	26,4
28,001-50,000	37,27
Over 50,000	43

Progressivity has certainly increased, but the use of diversified decreasing tax credits has led to an excessively accentuated differentiation between employed workers and all other tax payers. Only after 50,000 taxpayers of any type find themselves paying the same tax.

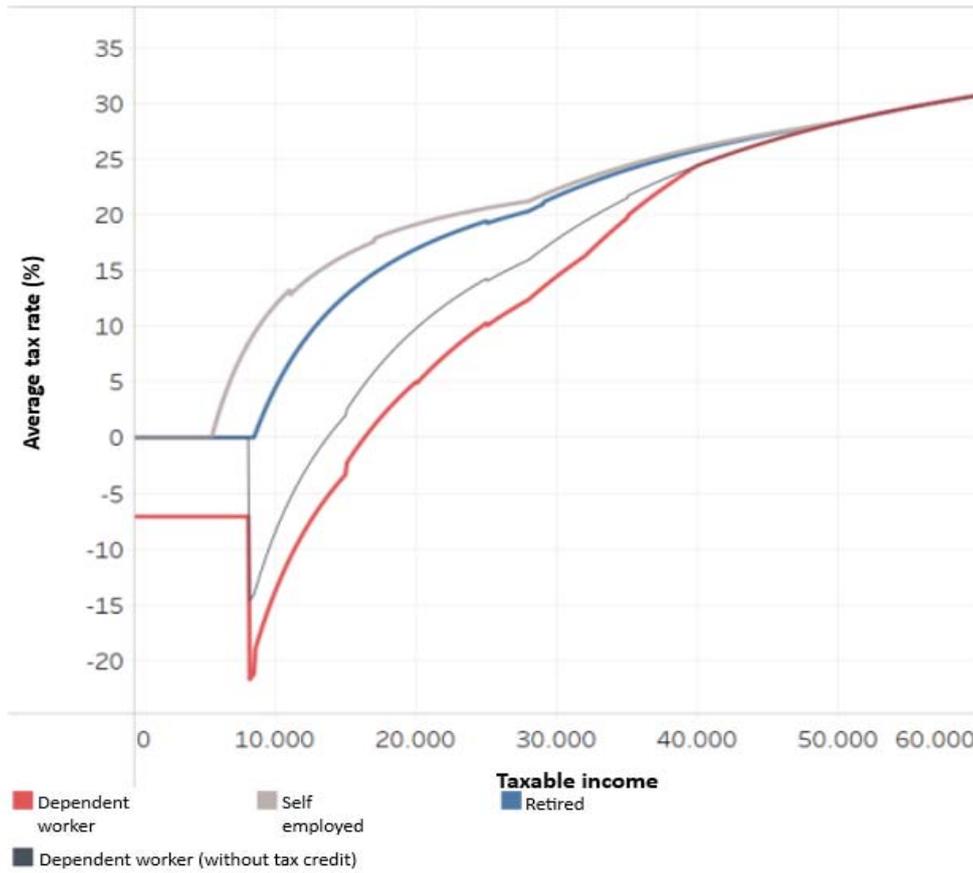
As shown in Fig. 4 (Parliamentary Budget Office UPB 2024), the average rates of employees and pensioners, in about twenty years, have diversified a lot; only after 50,000 taxpayers²⁶ of any type find themselves paying the same tax. To a lesser extent the same applies to the difference between pensioners and self-employed workers²⁷. The result is that only a small minority of taxpayers has the same personal income tax; all the others have *de facto* different tax regimes.

²⁴ Second bracket implicit rate 6.44; third 3.18.

²⁵ Second bracket implicit rate 3.28; third 2.2.

²⁶ 7 percent, according to 2023 Revenue Agency data.

²⁷ Obviously, we're referring to those self-employed workers who remain in IRPEF; the majority now opt for the flat rate of 15% (declaring a turnover not exceeding 85,000).



Source: UPB (2094), fig. 4.5, p. 82.

Fig. 4: Average Rates 2025

As far as employees are concerned, from the level of 9,000 euros, where the (negative) rate reaches its lowest level (i.e., the largest benefit to the worker), a rapid increase begins, making the tax elasticity very high; up to 40,000, it remains above 2, then declines first slowly (at 50,000, the elasticity is 1.54, still quite high)

and then more rapidly (at 100,000, the elasticity is 1.21). Essentially, IRPEF, particularly with regard to employees, has become a highly progressive tax on low- and middle-income earners, where over 90% of taxpayers live.

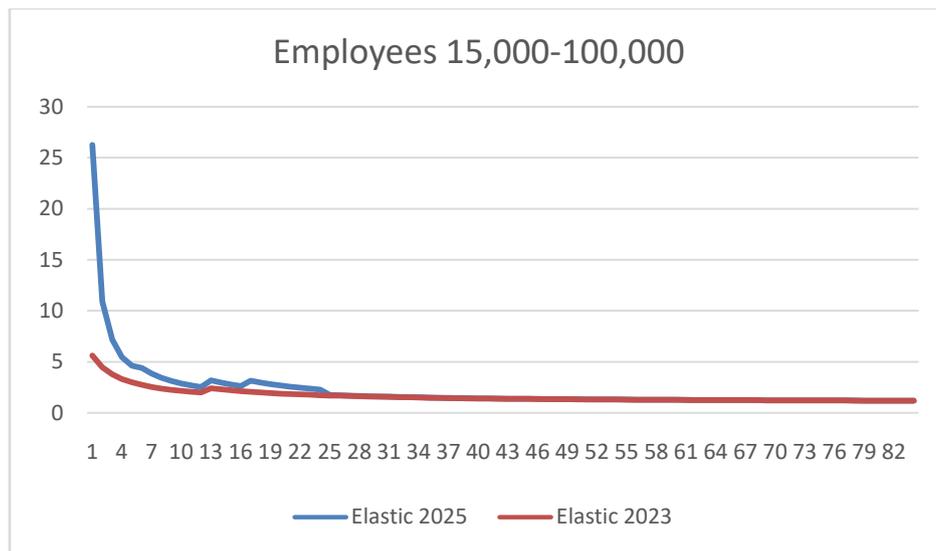


Fig. 5: Elasticities 2023-2025

As can be seen, the elasticity²⁸ in 2025 (Meloni) is clearly higher than that in 2023 (Draghi) up to 40,000, but even after that it remains slightly higher.

The decreasing tax credit method determines a reduction in the average rate, but, at the same time, it increases the marginal rate. All this paves the way for a further effect of brackets creeping: from 2021 to 2024 IRPEF increased by 28 percent. Of course, the two-year period 2022-23 was characterized by high inflation, but even with moderate inflation (2-3 percent), after a few years, taxpayers, especially employees, with incomes up to 50,000, find themselves²⁹ suffering from an increase in tax pressure.

In conclusion, we can ask ourselves what went wrong. We can distinguish three periods: in the first, an attempt was made to limit the increase in tax pressure, especially on low incomes, as there were not the resources to eliminate the effect of inflation on all incomes. In a second period motivations were more strictly political, also connected with the hypothesis of a flat tax, while in more recent years need to protect poor and middle classes workers from inflation has emerged again, thus easing the pressure on employers.

g) *Tax Reform Proposals*

Fifty years ago, IRPEF had thirty-two brackets with rates ranging from 10 to 72 percent. In the current year the (formal) rates are three, ranging from 23 to 43 percent³⁰. However, the intensity of progressivity cannot be inferred from the number of rates; as we have seen, progressivity has increased for most taxpayers, thanks to decreasing tax credits. These effectively create four brackets for pensioners and the self-employed, and eight brackets (considering two bonuses that are closely linked to the IRPEF structure). However, the strong elasticity determines a self-perpetuating process: to tone down bracket creeping, further increases in tax credits are necessary, always decreasing in relation to income; in this way average rates lower but not marginal rates, thus further increasing tax's elasticity.

In November 2021, the Draghi government presented a law for tax reform. Regarding direct taxation a dual system is proposed: income from work is subject to personal income tax (IRPEF), while income from wealth is subject to a single tax that would treat all the various taxes on capital income uniformly. These would be reduced to two: an existing one, tax on corporate income (IRES), and a second one that would unify the taxation of income from capital owned by individuals, currently subject to various taxes.

The law, after outlining the dual system, establishes that income from employment (and pensions) will be taxed in personal income tax (IRPEF), including that of self-employed workers (for the part related to the remuneration of work). Although not explicitly stated (for obvious reasons of political prudence), this would have entailed the elimination of flat-rate system for VAT-registered individuals (self-employed) and of separate taxation of productivity bonuses.

The main objectives are illustrated in the report of the Minister of Economy and Finance Daniele Franco (an expert of public economy). After stating that the revision must respect the principle of progressivity, offers two recommendations: "1) gradually reduce the average effective tax rates resulting from the application of personal income tax, also to incentivize labor supply and labor market participation, with particular reference to young people and second-income earners, as well as entrepreneurial activity and the disclosure of taxable income; 2) gradually reduce excessive variations in the marginal effective tax rates resulting from the application of personal income tax." The 2022 personal income tax reform had moved in this direction, but it had small effects on the elasticity of the tax, since the latter depends on the ratio between marginal and average rates. The excessive variations in marginal rates had been reduced, but the reduction in average rates offset the effect, maintaining high tax elasticity.

To understand the caution towards any proposal that could be perceived as a tax increase, it is worth emphasizing an interesting point of the proposed law concerning real estate registry; it is well known that, in Italy, cadastral revenue values differ from market values, as recorded by the Revenue Agency's Real Estate Market Observatory. Generally speaking, the older the property, the greater the discrepancy; overall, actual values are double the cadastral values, but with very marked fluctuations. Reconstructing the values and related incomes had long been necessary; it was therefore particularly appropriate to bring the cadastral values closer to market values.

However, since the government was aware of the extreme political sensitivity on the issue, the law declared that until 2026 "the provision that the information collected according to the above-mentioned principles will not be used to determine the tax base of taxes whose application is based on land registry results and, in any case, for fiscal purposes." Essentially, it proposed to implement an adjustment to the Land Registry but to postpone any potential tax consequences for five years, and therefore to another legislation. Consequences which are inevitable, not only for local taxes (IMU), but also if one wanted to move towards the dual system proposed by the reform.

²⁸ The interval considered starts from 15,000 because the elasticity 2025 at lower values is quite erratic with very high values.

²⁹ Of course, even all other taxpayers over 50,000 suffer the effects of inflation, but in a more attenuated way, since the increase in average rate is smaller.

³⁰ The intermediate rate of 35 percent will drop by two points from 2026.

The proposed reform law expires with the advancement of the general elections in 2022, due to the fall of Draghi's government.

h) A Continuous Tax on Earned Income

For a long time, from 1926 to 1973, Italy had a continuously progressive tax system: the Progressive Complementary Income Tax. The tax was imposed on a minority of income earners, starting from those who earned above-average incomes. As we have seen, the personal income tax (IRPEF) instead adopts the model, with numerous brackets, typical of Anglo-Saxon and Scandinavian countries; however, there was the exception of Germany (then federal). The continuous function is applied for the majority of *Einkommensteuer* taxpayers up to 67,000³¹; this is because the marginal tax rate grows linearly, and therefore too quickly. Sotwo different (quadratic) functions are applied, before moving on to a two brackets system for the highest income earners. Diana Estévez-Schwarz and Eric Sommer (2018) instead propose a single function that has a zero marginal tax rate at zero income, and a rate that tends to a finite value as the taxpayers' income increases.

The simplest form is the fractional function; it has two parameters: the tax rate *a* toward which the tax incidence tends (to infinity³²) and *K*, a parameter on which the curvature of the average and marginal tax rates depends. Since *Y* is income, the average tax rate (*tav*) is given by the function

$$tav = aY/(K+Y) \tag{1}$$

while the marginal tax rate (*tma*) is

$$tma = tav (2K+Y)/(K+Y) \tag{2}$$

For example, if *a* = 0.45 and *K* = 30,000, both the average and marginal tax rates start at zero. As income increases, the marginal rate increases more rapidly, but the difference with the average tends to decrease because *K* remains constant while *Y* increases. The tax elasticity reaches 1.71 at €6,000, then slowly begins to decrease. These are more reasonable values than the exaggerated ones caused by decreasing tax credits.

At the Following Four Income Levels, we have:

Table 4

	Average Rate	Marginal Rate	Elasticity
15000	15	24.5	1.65
30,000	22.5	33.6	1.49
60,000	30	39.9	1.33
120,000	36	42.2	1.19
240,000	40	44.4	1.11

However, this function does not take into account the necessity of a minimum exempt level. Currently, as we have seen, employees are exempt up to 8,500 euros, having a deduction of 1,955 and a tax rate of 23 percent. But the continuous function (as described) at 8,500 has a rate of 9.94, much lower than the current IRPEF rate. Therefore, a (fixed) deduction of 845 euros would be sufficient to obtain the same level of exemption. Certainly, in this way, elasticity at low-income levels³³ increases significantly, as the marginal tax rate remains unchanged, while the average rate decreases. However, the decrease quickly attenuates, and the elasticity falls below 2 at 21,000.

The fixed tax credit would be the third parameter of the fractional function indicated by Estévez Schwarz–Sommer (2018), which instead opt for a fixed deduction. The difference consists in the reduction not only of average rates but also of marginal ones. By setting the exemption at 8,500, the tax elasticity remains high, dropping below 2 only at 38,000. In this way, allowing diversified deductions for employees, pensioners and self-employed, we would not have a single function, but three distinct functions, although much less than in the current situation.

i) Dual System on Labor Income

In a dual system, the taxable base for personal income tax would consist not only of earned income, but without exceptions. Therefore, as mentioned, the flat-rate regime for self-employed people should be abolished. However, in individual businesses or partnerships, income derives not only from the work performed, but also from the capital employed; this component should be separated to identify only earned income. Even in some professions, such as medicine, professionals' work requires the use of expensive equipment and tools.

If leasing is used, this problem does not arise, as the financing cost is deductible. However, in the case of owned capital, the value of the appropriate rental fee (for the business or a branch of a business) should be determined by a rate of return on business capital. The value of the capital is estimated using various methods to arrive at an adjusted net worth, to

³¹ Above 67,000 two brackets apply with rates of 42 and 45 percent.
³² At infinity, both tax rates tend to *a*. But since even Elon Musk does not have an infinite income, for all incomes marginal tax rate is higher than the average rate.

³³ For low-income workers it is advisable to combine the IRPEF with an incentive tool such as Earned Income Tax Credit (EITC) replacing the two bonuses currently in force.

which unaccounted intangible assets (typically goodwill) are added. The value (or its return) will be subject to taxation under the other tax of the dual system, the tax on capital gains (directly or indirectly).

Self-employed workers often complain about the uncertainty of their jobs and the risks of illness, arguing that the progressive nature of the tax is detrimental to them; this is one of the arguments in favor of the flat tax. However, a response to these real concerns was provided long ago by William Vickrey (1939, 1947) with the proposal of a cumulative average that, based on income trends over time, recalculates the tax due by averaging the income stream. The proposal has never been fully implemented, except in a rather limited way for the carry-forward and carry-back system.

Among the characteristics of a tax system, one of the most important should be respect for horizontal and vertical equity. Article 53 of the Italian Constitution consists of two statements; the first says that "Everyone is required to contribute to public expenditures in proportion to their ability to pay." This implies that, with equal ability to pay, two people should pay the same amount of tax (horizontal equity). The second states that "The tax system is based on progressive criteria"; therefore, as the ability to pay increases, the tax should increase more than proportionally (vertical equity).

Economists and jurists have long debated how to define the ability to pay (Adam Smith). It has also been argued that vertical equity conflicts with productive efficiency³⁴ (Hall-Rabushka, 1981) and should therefore give way to the latter (introducing instead a flat tax, the stated objective of tax reform of Meloni government). There is no doubt, however, that our tax system is far from respecting both horizontal and vertical equity. Personal income tax (IRPEF) is now composed of three distinct tax systems with different average and marginal rates, in addition to a fixed rate on the notional income of many self-employed individuals.

In the previous pages, we've seen how our main tax, created precisely to implement the two aforementioned criteria, has changed radically; from a structure of equal rates for all taxpayers, with minimal differentiation, we've moved to separate structures. From a progression based on increasing marginal rates, we've moved to a system in which there are only three marginal rates, and progressivity, for most taxpayers, is provided by decreasing tax credits, which introduce implicit, differentiated rates; one for retirees and self-employed and five³⁵ for employees. It is therefore necessary to return to a unique tax that applies to all income from work, respecting the two principles of horizontal and vertical equity, with a more moderate

progressivity on low and medium incomes, and a more accentuated one on high incomes.

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³⁴ Moreover, the thirty years after the Second World War, known as the Thirty Glorious Years, had very high marginal tax rates.

³⁵ Five if the two bonuses are considered strictly linked to IRPEF, as is in fact more logical, otherwise in any case three.



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GJMBR-B Classification: LCC Code: QA76.9



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Keywords: artificial intelligence (AI), covid-19, e-business, industry 4.0, internet of thing (IoT).

I. INTRODUCTION

A disruptive era in technology has begun with the introduction of AI technologies, Big Data, IoT, and Blockchain. Artificial intelligence is transforming businesses by empowering robots to make intelligent judgments through its learning capabilities. Big Data has become an indispensable tool for businesses, enabling them to extract meaningful insights from large datasets and facilitating well-informed decision-making. By enabling smooth communication and automation between connected objects, the Internet of Things (IoT) is transforming the way we interact with the outside world. At the same time, Blockchain technology is transforming transaction security and trust by providing decentralized, transparent systems that challenge conventional ideas of dependability. When taken as a whole, these developments represent a paradigm change in the way we think about technology, offering

increased capabilities, efficiency, and creativity in a variety of fields. (Areiqat et al., 2021).

The convergence of blockchain, IoT, Big Data, and AI technologies has had a significant impact on a number of fields, especially in e-Businesses (Castillo & Taherdoost, 2023). AI enhances investment plans, Big Data examines market patterns, IoT streamlines transactions, and Blockchain guarantees safe and transparent financial transactions. AI-driven automation, Big Data analytics for preventive maintenance, IoT-enabled smart factories, and Blockchain for open supply chain management are some more ways that these technologies have revolutionized the manufacturing industry. Together, these technologies support increased capacities, efficiency, and creativity in a variety of businesses.

AI has revolutionized essential parts of operations and consumer relations, dramatically changing the face of e-businesses (Taherdoost, 2023; Castillo & Taherdoost, 2023). AI is used by e-businesses to give individualized client experiences. Chatbots and virtual assistants are utilized to improve communication and offer immediate assistance. These companies can now better understand customer behavior. Thanks to AI-driven analytics, which opens the door to customized marketing campaigns and flexible pricing structures. It also improves backend operations efficiency, enhancing logistics, inventory control, and supply chain management. AI's predictive powers aid in better decision-making, which helps e-businesses remain flexible and adaptable in the quickly changing digital marketplace (Areiqat et al., 2021). All things considered, the incorporation of AI technology into e-businesses promotes innovation and competitiveness within the ever-changing online ecosystem in addition to improving operational efficiency.

Businesses need to integrate AI into their everyday operations more and more urgently as the technology develops. This requirement has sparked a thorough investigation into the complex functions of AI, exploring its workings and the unique benefits it provides to e-businesses. This analysis covers the diverse effects of AI on a number of electronic commerce-related topics, from improving consumer experiences via tailored interactions to streamlining

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internal procedures like supply chain management and decision-making.

II. STUDY OVERVIEW

a) *The Artificial Intelligence (AI)*

Artificial Intelligence integration has become a transformational force in the ever-changing world of digital commerce, transforming how e-businesses run. AI features are used in a wide range of applications, from chatbots that provide smooth customer interactions using Natural Language Processing (NLP) to machine learning algorithms that provide tailored suggestions. AI-powered predictive analytics improves pricing tactics and streamlines supply chain management, highlighting a notable increase in operational efficiency.

Artificial Intelligence (AI) is the creation of computer programs or systems that can carry out tasks that normally call for human intelligence. These include handling hard issues, comprehending natural language, identifying patterns, and learning from experience (Ali *et al.*, 2023). AI seeks to build systems that, like human brains, are able to learn, adapt, and perform tasks without the need for explicit programming.

The business landscape is being drastically changed by AI, which is also radically changing how businesses function and make decisions (Allioui & Mourdi, 2023). Fundamentally, AI is the creation of intelligent machines that can think, learn, and solve problems to enhance human abilities. AI takes on diverse shapes in the business domain. For example, machine learning algorithms facilitate predictive analytics, while natural language processing improves consumer relations. Businesses may automate repetitive tasks, extract valuable insights from large datasets, and streamline operational procedures with the help of this game-changing technology. AI integration is becoming a strategic requirement for businesses looking to boost productivity, acquire a competitive advantage, and open up new creative opportunities (Allioui & Mourdi, 2023).

AI is having an impact on organizations in a variety of industries, including manufacturing, retail, healthcare, and finance. It helps with diagnosis and individualized treatment plans in healthcare and optimizes investment strategies and automates risk management in finance. AI-driven automation boosts productivity in manufacturing, and it enables recommendation systems and improves the shopping experience for customers in retail (Dwivedi *et al.*, 2021).

But even with all of the benefits, firms still have to deal with issues like data protection and ethical concerns. A significant limitation is the possibility of making biased decisions (Ray, 2023). When AI systems use historical data to learn, they may reproduce or even amplify preexisting biases in the data. This raises ethical questions, especially in delicate situations like financing,

hiring, or dealing with customers. A further drawback is that some AI systems lack transparency (Adadi & Berrada, 2018). A lot of sophisticated machine learning models function as "black boxes" (Rudin, 2019), which makes it difficult to understand how they arrive at particular conclusions. This lack of openness can impede understanding and trust, two important factors in business decision-making.

b) *The Industry 4.0*

The 4th industrial revolution, also known as industry 4.0 has come to automate traditional way of managing industries for optimum and efficient production. It is quite a revolutionary paradigm shift in industry and manufacturing. It includes the incorporation of digital technologies into many areas of industrial processes, resulting in "smart factories" that are automated, connected, and have data interchange capabilities. Industry 4.0 enables a more productive, adaptable, and intelligent manufacturing environment by utilizing technologies like the Internet of Things (IoT), artificial intelligence, big data analytics, and cyber-physical systems (Rojko, 2017). The Industry 4.0 and Internet of Things (IoT) are two different concepts having two distinct view in term of terminologies and uses. It sometimes been regarded as similar things but can be used interchangeably. The other view asserted that IoT is a resources of Industry 4.0, and as such it can be regarded to as an activator to the concept of the 4th Industry (Aheleroffet *al.*, 2020).

Moreover, due to the industry's extensive use of sensors and control systems, there is an enormous amount of data (Lee *et al.*, 2015). It requires special care to manage such a large volume of data in an industry, also known as "big data" (Wang *et al.*, 2022). Cloud storage services are designed to use for such purposes. The production line can operate well with the least amount of direct human involvement and with fewer errors in real-time interactions by accessing the data demanded and enabling self-decision-making algorithms for the machines using CPS applications. An integrated CPS system that uses smart manufacturing to automate will be more autonomous in its dynamic decision-making.

The German government was masterminded the idea of the Industry 4.0 in early of year 2011 (Rojko, 2017). That was the beginning of new generation for industries to enhance performance and productivity with the trending technologies like Internet of Service (IoS), IoT, big data, RFID tags, and so on. The introduction of 'steam engine' is characterized as the 1st industrial revolution. (Kelly, *et al.*, 2023). The transition from traditional way of production to mass production caused some difficulties in the industries globally. The spreading of electricity uses in the industries, geared the 2nd Industrial revolution (Coelho *et al.*, 2023). However, the 3rd industrial revolution brought about advances of

Information Technology (IT) and the prevalence of the electronics worldwide (Kelly, *et al.*, 2023). The 4th industry is all about the current technological transformation that changed the global supply chain for better productivity. Cyber Physical Systems (CPS) are now

crucial groundwork in many different industry sectors that facilitate advancements in the widespread use of sensors, data acquisition systems, computer networks, and cloud computing.

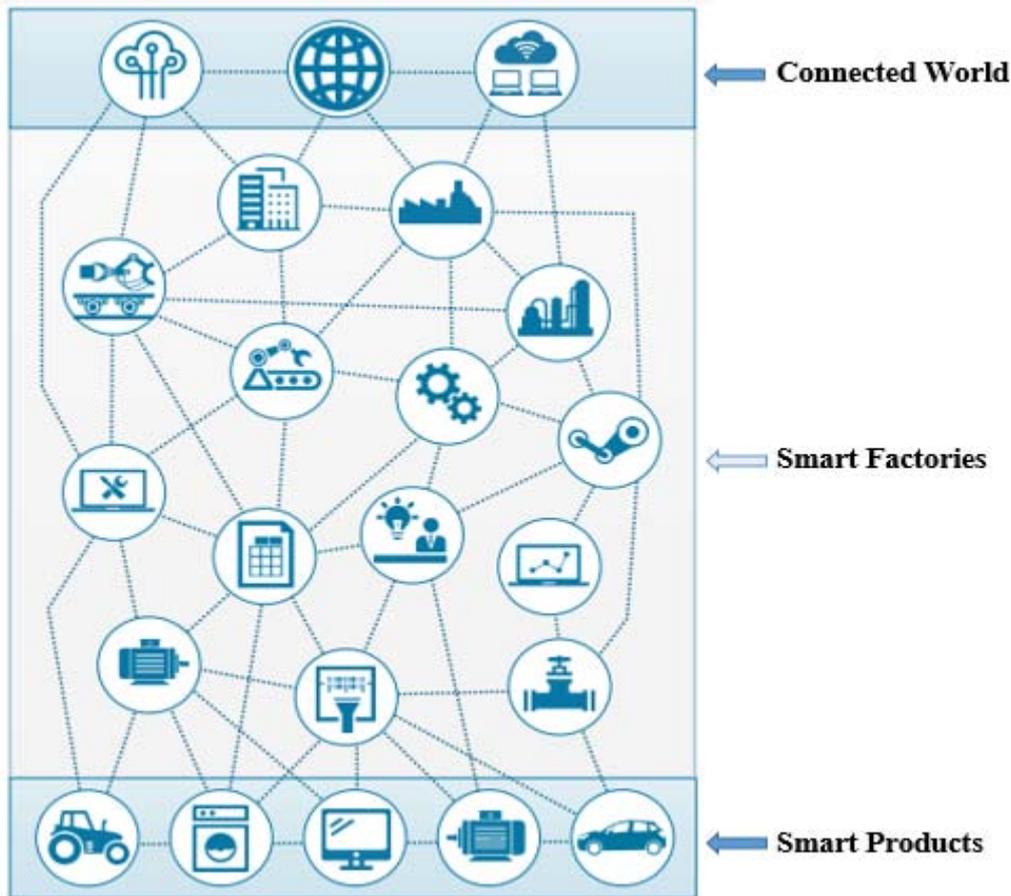


Fig. 1: Diagrammatic Structure of Industry 4.0. (Schweichhart, 2016)

Businesses need specialized infrastructures that can introduce cutting-edge business models in order to put the technology of Industry 4.0 into operation. Automatic virtual metrology, which may accomplish the zero-defect aim in automation and expand to Industry 4.1 as the next step, would make the vision of Industry 4.0 expansion a reality (Caiazzo *et al.*, 2023). Even though the concept of Industry 4.0 has been widely recognized but not fully adopted and implemented (Mourtzis, *et al.*, 2022).

i. *Architectural Model for Industry 4.0 (RAMI 4.0)*

Industry 4.0 concepts are implemented using a comprehensive framework that describes the principles and structure of the Reference Architectural Model for Industrie 4.0 (RAMI 4.0). In the framework of the Fourth Industrial Revolution, RAMI 4.0, developed in Germany, offers a standardized method for designing and integrating smart manufacturing platforms. The infor-

mational, functional, and communication aspects are the three primary dimensions covered by the paradigm.

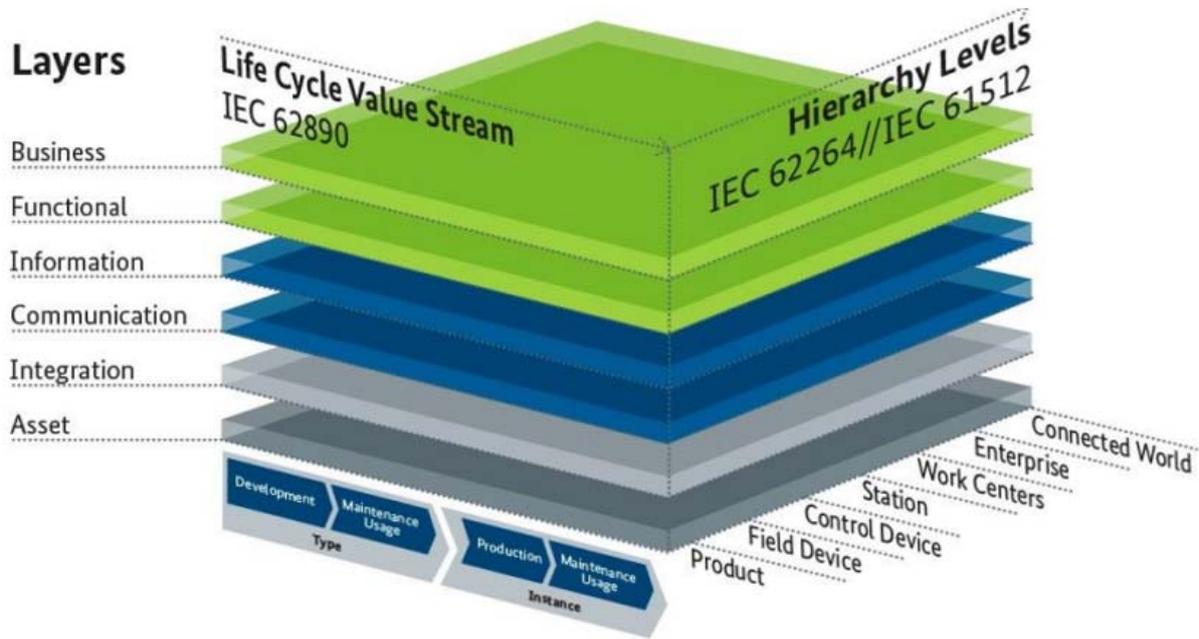


Fig. 2: Architectural Model for Industry 4.0 (RAMI 4.0) adapted from (Schweichhart, 2016)

1. *Informational Dimension:* Industry 4.0's information models and data structures are the main subject of this dimension. Among its components is the Asset Administration Shell (AAS), a digital representation of real assets. AAS provides the identification, behavior, and lifecycle of the asset and serves as the basis for smooth communication and interoperability amongst different components in the manufacturing environment.
2. *Functional Dimension:* This dimension outlines the procedures and features that make up Industry 4.0. It consists of the Industry 4.0 parts, like sensors, actuators, and communication modules that are in charge of particular tasks. The functional layer of RAMI 4.0 enables a scalable and adaptable architecture, enabling the integration of various technologies and applications.
3. *Communication Dimension:* RAMI 4.0 deals with the architecture of communication needed to ensure smooth component interaction. It makes use of standards and communication protocols to facilitate dependable data transmission. This component highlights the value of interoperability and open communication interfaces, which enable the integration of diverse systems and devices within the industrial ecosystem.

An organized and defined method for directing the creation and application of Industry 4.0 solutions is offered by RAMI 4.0. It encourages interoperability, scalability, and flexibility in smart manufacturing systems by creating a common language and design. The model

is well known for providing a fundamental framework for businesses looking to digitally transform their industrial processes and adopt the ideas of the Fourth Industrial Revolution.

c) *The Internet of Things (IoT)*

The Internet of Things (IoT) refers to the interconnected network of physical devices embedded with sensors, software, and other technologies, enabling them to collect and exchange data over the internet. This concept extends beyond traditional computing devices, encompassing everyday objects, machines, and systems that communicate with each other to facilitate intelligent decision-making and automation. IoT is essential for establishing a smooth, networked environment that enhances functionality, ease, and efficiency in a variety of fields (Vermesan & Friess, 2022). The fundamental elements of the Internet of Things are at its core, with each one contributing uniquely to the development of connectivity, data processing, and functional efficacy. Sensors and actuators are key components of the Internet of Things (IoT), serving as both data collectors and means of facilitating actions based on collected data. Together, these elements make up the IoT devices' sensory interface. The range of connectivity protocols, including Bluetooth, Wi-Fi, Zigbee, and cellular networks, which enable smooth communication between linked devices, further improves the system's efficiency as depicted below.

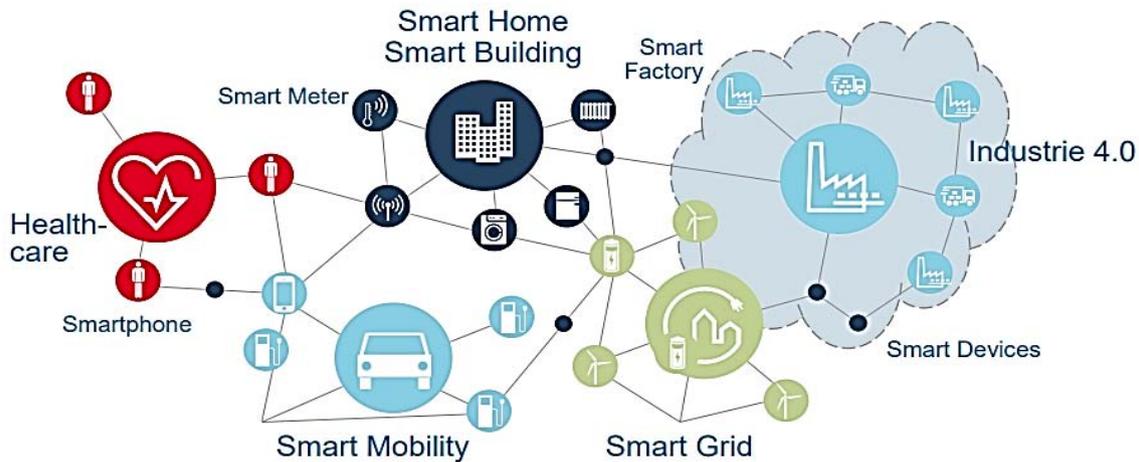


Fig. 3: IoT Architecture

IoT platforms- platforms created especially for the administration and observation of devices- are essential to the Internet of Things architecture (Afzal et al., 2019). These platforms provide all-inclusive solutions that cover data analytics, device management, and security measures to guarantee the smooth functioning of the Internet of Things ecosystem. Strong security measures are also necessary to protect the integrity and privacy of transferred data. These methods include encryption, authentication, and access protocols.

Both edge computing and cloud-based platforms are crucial elements in the data processing domain that carry out the work of effective data analysis and storage (Gupta & Quamara, 2020). Well-designed User Interfaces (UI) and User Experiences (UX) enable easy control and seamless device interaction, hence facilitating user interaction within the IoT ecosystem. Specifically, power management tactics are essential for Internet of Things devices that run on restricted power supplies, highlighting the necessity of optimizing energy use to increase the lifespan of devices. Together, these component parts comprise the complex framework of the Internet of Things, a paradigm-shifting technology impacting a wide range of industries and applications.

i. *An Algorithmic Model of Fundamental Steps of IoT Operation*

We examine the computational processes in the following mathematical model that determine the functionality of IoT in order to explain its operational dynamics. Every Internet of Things (IoT) device is equipped with distinct identities and necessary parts, including sensors for data collection and actuators for actuation, from the time of device activation. The next step is gathering information from the surroundings of the gadget in an organized manner and using communication protocols to send it over the internet. After being transferred, the data is carefully processed and evaluated on a centralized IoT platform, where algorithms that make decisions use the results to guide

particular activities. Actuators then carry out these activities, eliciting reactions from the surrounding physical environment. Well-designed interfaces enable user interaction and provide intuitive control and monitoring. Data integrity must be protected at all times with the use of security methods like authentication and encryption. Device status is continuously monitored to guarantee the IoT ecosystem runs smoothly. This completes the cycle of continuous data collection, analysis, and response.

Let D_i represent the i -th IoT device with sensor S_i and actuator A_i ,

Initialization: $D_i = \text{Initialize Device (device_idi, } S_i, A_i)$

Data Acquisition: $\text{Data } i = \text{Collect Data (} D_i)$

Communication: $\text{Transmit Data (Data } i, \text{ Communication Protocol)}$

Data Processing: $\text{Processed Data } i = \text{Process Data (Data } i)$

Decision-Making: $\text{Decision } i = \text{Make Decision (Processed Data } i)$

Actuation: $\text{Activate Actuators (} D_i, \text{ Decision } i)$

User Interaction: $UI = \text{User Interface ()}$

Security Measures: $\text{Implement Security ()}$

Continuous Monitoring: $\text{Continuous Monitoring (} D_i)$

End of Cycle: $\text{IoT Cycle (} D_i) = \text{Loop (Collect Data, Transmit Data, Process Data, Make Decision, Activate Actuators, Continuous Monitoring)}$

The algorithmic representation outlines the interconnected processes that define the functioning of the Internet of Things and captures the basic steps of its operation. The algorithm captures the complex interactions between elements that determine the operating environment of the Internet of Things, from data collection and transmission to centralized processing, decision-making, and actuation. This methodical approach guarantees the Internet of Things

system's smooth operation and serves as the foundation for its flexibility and reactivity in a variety of applications, such as smart homes, industrial automation, and healthcare.

d) *Electronic Business (E-Business)*

The term "e-business," which stands for "electronic business," describes how commercial operations and transactions are carried out while employing digital and internet technology (Castillo & Taherdoost, 2023). In order to facilitate different elements of company operations, such as the purchasing and selling of goods and services, customer interactions, and internal processes, it entails the use of electronic means, such as websites, online platforms, and digital communication tools. E-business includes many other types of activities, such as digital marketing, electronic supply chain management, online shopping, and customer relationship management.

The idea behind e-business is using digital technologies to improve and optimize conventional company procedures. This covers electronic communication, digital marketing, online sales, and the incorporation of digital solutions into several areas of business operations. E-business can be adopted in a variety of industries, including manufacturing, services, retail, and finance. It is not limited to any one industry. Beynon-Davies and Jones (2016) assert that two interrelated trends- a growing reliance on electronic networks and an enhanced centrality of information- have an impact on global markets. This means that businesses' production, distribution, and consumption of their products are made simpler by technological advancements brought about by increased access to information and communication technologies.

i. *E-Business Models*

E-Business Models is an organizational strategic structure and methodology for conducting electronic business activities while utilizing digital technology and the internet (Castillo & Taherdoost, 2023). It includes the planning and organization of a company's online interactions, transactions, and processes in order to generate, provide, and capture value. The organization's digital interactions with clients, partners, and other stakeholders are outlined in the e-business model. It outlines the monetization strategies, distribution networks, and overarching plan for accomplishing corporate goals in the online sphere.

The use of digital technology, such as online marketing, data analytics, mobile applications, and e-commerce platforms, is essential to the e-business model (Castillo & Taherdoost, 2023). To effectively design the online experience, it is necessary to understand the digital behaviors, preferences, and expectations of the target audience. The nature of the business, the dynamics of the market, and the particular objectives of the organization all influence the e-

business model, which is not a notion that works for all businesses.

Key components of an e-business model include the identification of customer segments, the establishment of online channels for product or service delivery, the development of effective customer relationships in the digital space, and the exploration of revenue streams, such as e-commerce transactions, subscription models, or advertising. The e-business model must also address considerations like data security, user privacy, and the integration of emerging technologies to stay competitive in the rapidly evolving digital landscape (Taherdoost, 2023). E- Business models according to Dubosson-Torbay et al., (2022) are classified based on the nature and landscape of the business. Below are some of the commone-Business model that AI will make a significant impact when fully integrated.

1. *E-commerce Model:* Enabling the online exchange of goods and services, the E-commerce model is a fundamental component of the digital economy embodying the online exchange of goods and services between businesses and consumers (B2C) or among businesses (B2B). Companies set up virtual shops, like Amazon, to facilitate international trade between customers and enterprises. This concept offers unmatched accessibility and ease, surpassing geographical limitations. It has revolutionized traditional retail by establishing vibrant online markets that reshape the nature of trade in the digital era.
2. *Subscription Model:* The core of the subscription business model is giving clients continuous access to a good or service in return for consistent, recurrent payments. This concept is best illustrated by platforms that provide consumers with ongoing and changing experiences, such as Netflix and Adobe Creative Cloud. Because of its adaptability across multiple industries, it offers businesses steady revenue streams and builds long-lasting connections with subscribers by continuously delivering value.
3. *Advertising Model:* Through the display of relevant adverts to users on digital platforms, the advertising model makes money. This strategy is used by content websites like Buzz Feed and social media behemoths like Facebook, which give consumers access to free material in return for relevant advertisements. This model highlights the mutually beneficial interaction between content providers, advertisers, and consumers by striking a balance between user experience and income production, thereby defining the economic dynamics of the digital world.
4. *Affiliate Marketing Model:* Is a cooperative strategy that allows companies to use affiliates to market

and sell their goods and services in exchange for commissions. Affiliates employ original links to increase traffic and purchases; they are frequently influencers or content producers. This strategy, as shown by Amazon's Affiliate Program, encourages low-cost collaborations that let companies reach a wider audience while giving affiliates chances to make money from their online presence.

5. *Digital Products Model*: This business strategy focuses on producing and marketing intangible products and services, such as online courses or e-books. The adaptability of this paradigm is demonstrated by digital product marketplaces such as Etsy or Udemy. Through leveraging the market for digital content, companies are able to overcome physical limitations and provide scalable and easily available products to a worldwide customer base.
6. *P2P (peer-to-peer) Model*: By encouraging direct interactions between people without the need for middlemen, the peer-to-peer model upends established industries. Through direct connections between consumers and service providers, platforms such as Airbnb and Uber promote resource efficiency and foster community building through cooperative consumption.
7. *Marketplace Model*: This model expands customer choice and promotes healthy competition by offering virtual venues for a number of vendors to display and provide goods and services. This paradigm is best shown by platforms such as eBay and Amazon Marketplace, which streamline transactions and give firms access to a large client base within a controlled environment.
8. *Blockchain and Cryptocurrency Model*: To enable safe and transparent transactions, the Blockchain and Cryptocurrency Model makes use of digital currencies and decentralized ledger technology. Blockchain-based platforms like Ethereum and cryptocurrency exchanges like Coinbase upend established financial institutions by bringing ideas like decentralization and trustless transactions, which spur innovation across a variety of industries.

III. AI AND ITS PRACTICAL IMPLEMENTATIONS IN BUSINESS PROCESSES

AI has a longstanding history, and its widespread adoption was significantly catalyzed with the public launch of ChatGPT in November 2022 (Montenegro-Rueda, 2023). Notably, ChatGPT became the fastest-growing app to exceed 100 million users in couple of weeks (Wu et al., 2023), marking a noteworthy milestone. Statistics support the use of AI; according to IBM, 35% of companies have already integrated AI into their operations. Surveys and analysis carried out globally support this trend (Webster 2023; Watts &

Haan, 2023). The business world is especially excited about AI's ability to increase capacities and lower operating expenses. Netflix serves as an exemplary case in point, having purportedly saved \$1 billion by utilizing machine intelligence. (Webster, 2023). Moreover, the ability of AI to increase operational efficiency by as much as 40% demonstrates the revolutionary effect it has on corporate performance.

Because the AI disruptive potential and ability to touch many aspects of business and human life, it is being embraced by a wide range of companies and sectors (Yin et al., 2021; Lee & Yoon 2021; Davenport & Ronanki, 2018; Galante et al., 2023; Javaid et al., 2023). The capacity of AI to automate activities, improve productivity, offer data-driven insights, and spark creativity across a range of industries is what is driving its adoption. Organizations hoping to prosper in the digital era are seeing the incorporation of AI technologies as a strategic need.

a) *AI Adoption across Global Industries*

AI is transforming various sectors and is expected to develop at a rate of 37.3% each year between 2023 and 2030, according to Grand View Research (Isabella et al., 2023). This rapid growth highlights the growing impact that AI tools are expected to have in the years to come. With a significant 58% of businesses currently utilizing AI technologies and another 30% considering integration into their operational frameworks, China leads the world in AI adoption (Webster 2023; Watts & Haan, 2023; Maghsoudi et al., 2023). The United States, on the other hand, has a much lower adoption rate of artificial intelligence (AI). Of the companies there, 25% have integrated AI into their operations, and a noteworthy 43% are still in the exploratory stage, evaluating the advantages and possible uses of integrating AI into their business processes (Webster 2023; Watts & Haan, 2023; Dixon, 2023). This difference in adoption rates highlights how these two powerful countries approach and prioritize using AI differently.

b) *How Businesses utilizes AI Technologies?*

Industries are using AI more and more as a critical tool to streamline and improve their operating procedures. Businesses are utilizing AI for a wide range of purposes, according to a Forbes Advisor poll (Watts & Haan, 2023). The renowned statistics firm, Forbes Advisor, made a compilation of global statistic on how AI is being utilized by businesses. The majority of responders cite customer service as a key point, with 56% using AI to improve customer support. Adopted by 51% of firms, cybersecurity and fraud management are other noteworthy areas of AI integration. In addition to these main uses, customer relationship management accounts for 46% of firms' AI deployments, where AI is widely employed. Digital personal assistants are also used in organizational activities; 47% of the organi-

zations polled acknowledged this. Among the other notable uses of AI are product recommendations (33%), content creation (35%), and inventory management (40%). Additionally, companies are using AI for tasks like audience segmentation (24%), talent sourcing and recruitment (26%), accounting (30%), and supply chain

operations (30%). The widespread use of AI across a variety of business disciplines is indicative of a strategic understanding of the technology's diverse range of applications and potential benefits for improving operations. Below is the graphical representation of the above analysis.

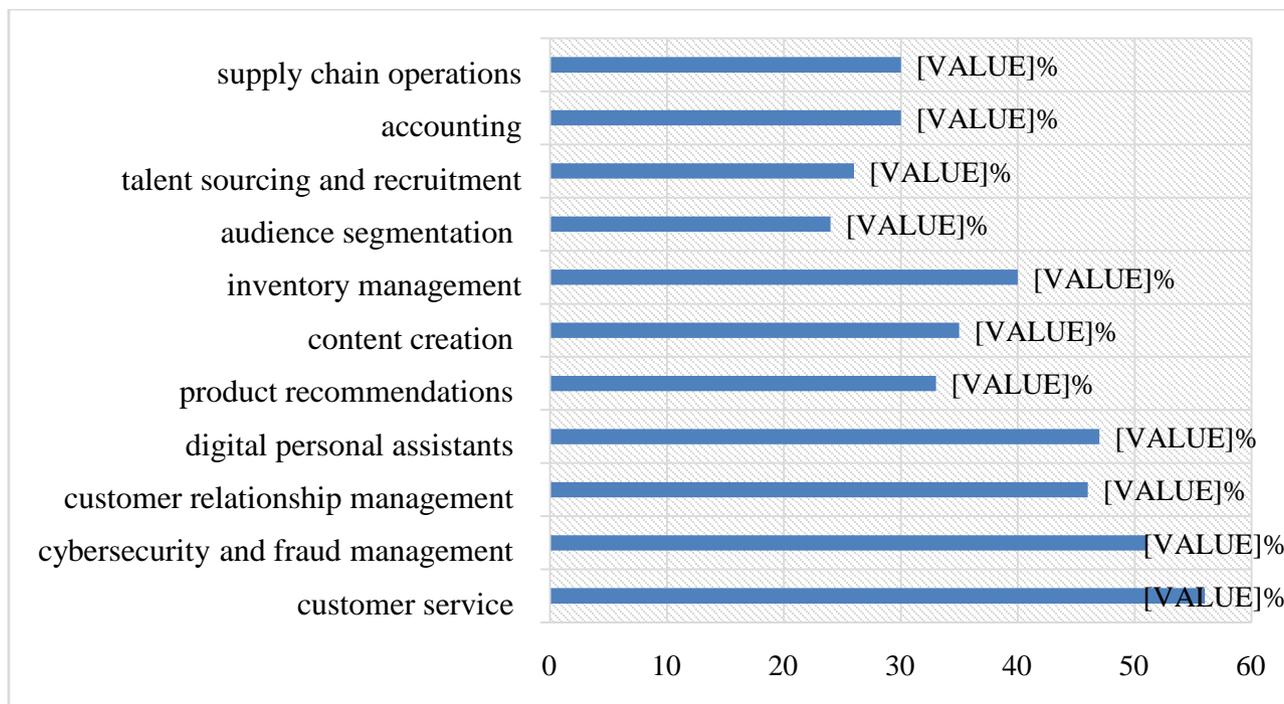


Fig. 4: Businesses using Artificial Intelligence as of June 2023

c) *Businesses using AI to Improve Clients' Experience*

AI plays a pivotal role in augmenting customer experiences across various touchpoints. As indicated by the Forbes Advisor survey (Watts & Haan, 2023), a substantial 73% of businesses either utilize or intend to implement AI-powered chatbots for instantaneous messaging. Additionally, 61% of enterprises employ AI to enhance the optimization of email communications, while 55% leverage AI for delivering personalized services, exemplified by product recommendations.

Furthermore, businesses are utilizing AI in the creation of extended written content, such as website copy (42%), and for tailoring advertising content to individual preferences (46%). AI has also made notable inroads into the handling of phone calls, with 36% of respondents indicating current or prospective use of AI in this domain. Additionally, 49% of businesses deploy AI for the optimization of text messages (Watts & Haan, 2023). With the pervasive integration of AI across diverse customer interaction channels, there is a discernible enhancement in the efficiency and personalization of the overall customer experience.

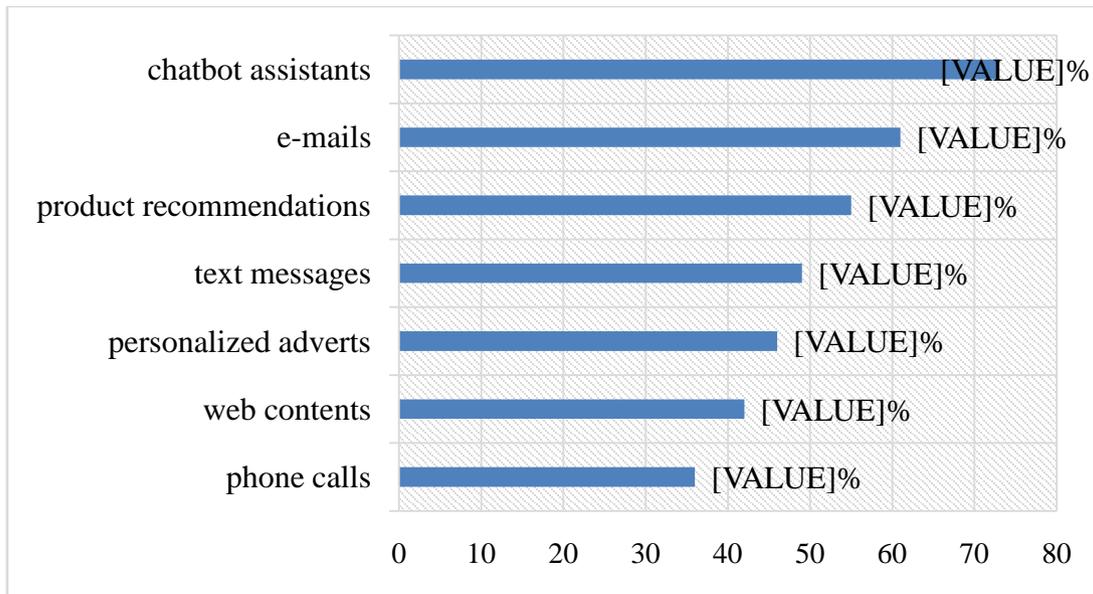


Fig. 5: Businesses using AI to Improve Clients' Experience as of October 2023

d) *The Future Trends of AI adoption in Businesses*

As per the projections from Next Move Strategy Consulting, there is a strong potential for growth in the AI business over the next ten years. It is projected to grow dramatically; its present valuation of approximately 100 billion dollars is projected to climb twentyfold by 2030, to almost two trillion dollars (Thormundsson, 2023). The AI market's broad reach spans numerous

industries, including supply chains, marketing, product manufacturing, research, analysis, and more. Artificial intelligence is expected to be incorporated into almost every industry's operating framework. The adoption of chatbots, AI that generates images, and the growth of mobile applications are some of the major themes propelling this evolution and will together shape the direction of AI advancements in the years to come.

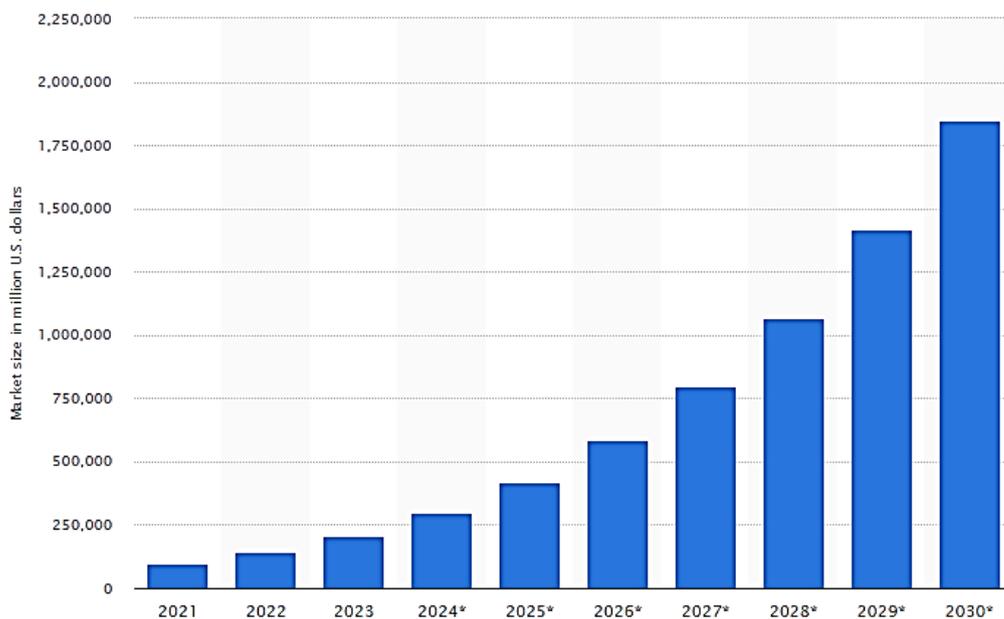


Fig. 6: Global AI Market Size 2021-2030 (Thormundsson, 2023)

However, According to Grand View Research (Isabella *et al.*, 2023), AI is transforming various sectors and is expected to develop at a rate of 37.3% or more each year between 2023 and 2030, This rapid growth highlights the growing impact that AI tools are expected

to have in the years to come. It is anticipated that AI use would increase exponentially across a range of industries. Businesses are starting to realize how AI may improve productivity, efficiency, and decision-making. The growing number of businesses incorporating AI

technologies into their operations is indicative of this (Smith, 2021). As AI technologies advance, the following are some important areas that should receive increased attention.

Future trends in AI adoption in business include more personalization, an emphasis on ethical issues, broad integration, and advancements in technologies like edge AI. More advancements and breakthroughs in the AI space are anticipated as the technology expands quickly and companies continue to see the benefits of AI in streamlining operations and obtaining a competitive advantage.

IV. LIMITATIONS

While there are many advantages to organizations implementing artificial intelligence (AI), there are drawbacks as well. Below is a thorough explanation of the general limitations on the use of AI in business processes:

1. *Data Dependency:* AI systems rely significantly on the quantity and quality of data for training and decision-making (Duan et al., 2019). But the problem comes when businesses face problems like obsolete information, bias, or a lack of data. Biased training data can sustain discriminatory practices in areas like recruiting where impartial and accurate judgments are essential (Raghavan et al., 2020), perhaps resulting in unexpected effects and legal repercussions.
2. *Lack of Explainability:* Since many AI models function as "black boxes," (Rudin & Radin 2019), it can be difficult to understand how they make decisions, particularly for stakeholders who aren't technically inclined. In industries where explainability is essential for regulatory compliance or ethical considerations, a lack of openness may impede adoption. Without providing clients or regulatory agencies with a clear explanation, financial firms may find it difficult to defend AI-driven loan decisions.
3. *Ethical Concerns:* The adoption of AI carries a great deal of ethical responsibility since AI systems may unintentionally reinforce or magnify societal prejudices found in training data (Lloyd, 2019). Preventing discrimination and ensuring justice are difficult tasks with practical repercussions. For instance, facial recognition software has come under fire for being biased against specific ethnic groups, which has raised questions about the moral implications of the technology. (Schuetz, 2021; Van Noorden, 2020).
4. *High Initial Costs:* Implementing AI technology frequently necessitates a sizable upfront investment in software, infrastructure, and qualified staff. This can be a major obstacle, especially for small and medium-sized businesses (SMEs) that have little

funding. For example, the initial expenditures may be too high for a manufacturing organization wishing to use AI-powered predictive maintenance systems.

5. *Integration Challenges:* When working with legacy systems, integrating AI into current business processes can be particularly difficult and disruptive (Lee et al., 2019). Employee resistance and possible disruptions to workflow could make integration difficult. For example, switching from human customer service to AI-powered chatbots may encounter opposition and require cautious change management techniques.
6. *Risks to Security:* Adversarial attacks, in which malevolent parties alter input data to trick the model, can occur to AI systems (Radanliev & Santos, 2023). It is crucial to guarantee the security of AI systems, particularly in delicate fields like cybersecurity. Strong cybersecurity AI solutions are necessary to prevent security protocol manipulation, which emphasizes the necessity for constant monitoring and upgrades.
7. *Regulatory Compliance:* Businesses face difficulties in ensuring compliance due to the changing regulatory environment surrounding AI. Regulations may differ between different locations, which makes it difficult for businesses with a global presence. For example, the GDPR in Europe places severe limits on the application of AI and emphasizes user consent and transparency (Seizov & Wulf, 2020).
8. *Overreliance on AI:* If AI systems are overused without human supervision, there could be disastrous outcomes if they malfunction or make bad decisions (Shively et al., 2018). It's critical to strike the correct balance between automation powered by AI and human intervention. For example, in complex, unpredictable contexts, autonomous cars may encounter difficulties that call for human involvement to ensure safety.

V. RECOMMENDATIONS AND FUTURE DIRECTION

1. *Explainability and Trust:* Making sure AI algorithms are transparent and explainable is becoming increasingly important as AI systems become more commonplace. Businesses are realizing how critical it is to foster trust with stakeholders, consumers, and users by clearly outlining the reasoning behind AI-driven choices.
2. *Personalization:* Providing individualized experiences is a major factor in increasing consumer satisfaction, and artificial intelligence is essential to making this happen. It is anticipated that companies would use AI more and more to evaluate client data

and offer customized goods, services, and marketing plans.

3. *Edge Computing and Edge AI:* There's a growing movement to use AI closer to the edge, where data is generated. Edge AI makes it possible to process data in real-time, which lowers latency and improves the effectiveness of applications in industries including manufacturing, healthcare, and the Internet of Things.
4. *Ethics and Governance:* As AI becomes more prevalent, ethical questions and frameworks for governance are becoming more and more important. In order to achieve responsible AI implementation, businesses are required to engage more in ethical AI practices, addressing concerns like bias, justice, and accountability and collaborative workflows.
5. *Collaborative and Human-AI Interaction:* More Human-AI interaction will be necessary for enterprises to utilize AI in the future. Companies are investigating how to use AI to enhance human capabilities, resulting in more efficient and cooperative operations.
6. *Cybersecurity:* AI is playing a bigger part in cybersecurity as a result of the growing sophistication of cyberattacks. AI-driven security systems that can analyze trends, spot anomalies, and react instantly to cyberattacks are expected to be adopted by businesses.
7. *Decision-Making Processes:* AI is being used more and more to assist in making complicated decisions. Businesses are depending on AI systems to evaluate enormous volumes of data and deliver actionable insights as AI algorithms get more complex. This helps them make better strategic decisions.

VI. CONCLUSION

The COVID-19 pandemic has caused a substantial shift in consumer behavior, requiring businesses all over the world to quickly adjust to the new reality of a greater reliance on online shopping. This change has been especially noticeable with the growth of e-commerce and internet platforms. The research discussed here adds to the current conversation by illuminating the pandemic's significant effects on patterns of production and consumption. Moreover, it emphasizes the critical role that artificial intelligence (AI), industries 4.0, and the Internet of Things (IoT) play in coordinating innovative solutions to overcome the obstacles presented by the global health crisis.

The study emphasizes how flexible Industry 4.0 and the Internet of Things are in reacting to the evolving business landscape. Notably, AI turns out to be a major enabler in this paradigm change, helping humans make

important decisions on their own and giving them insightful information. The conversation also explores the idea of IoT operations, using an algorithmic model to explain the nuances of its capabilities. Understanding the dynamic interaction between IoT and AI inside current e-Business models requires a comprehensive understanding. The study expands its analysis to the global use of AI, offering insights into how businesses use AI to improve customer experiences and efficiency as they navigate this changing landscape.

The adoption of AI in the future is examined, with a focus on the industries where exponential growth is predicted. Despite these developments, it's critical to recognize the restrictions and difficulties that come with integrating AI into corporate operations. The study carefully outlines the main drawbacks, which include significant upfront expenses for implementing AI as well as data dependence, explainability issues, and ethical dilemmas. Every restriction is covered in relation to actual cases and the effects on the industry. To tackle these issues, future research paths are proposed, such as the creation of human-AI collaboration models, cost-effective deployment methodologies, and ethical AI frameworks.

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Macroeconomic Factors and Stock Market Return in Nepal

By Narayan Kattel

Purbanchal University

Abstract- This study examines the relationship between key macroeconomic variables and the stock market return in Nepal, particularly focusing on the NEPSE Index. Using time series data from 2014 to 2023 and employing multiple regression analysis, the study evaluates the influence of interest rate, inflation rate, exchange rate, industrial production, and broad money supply on stock market performance. Results reveal that exchange rate and money supply significantly and positively affect NEPSE, while inflation and interest rates show a negative but statistically insignificant impact. The findings are expected to aid investors and policymakers in understanding economic drivers of market behavior in Nepal.

GJMBR-B Classification: JEL Code: E44, G12



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Macroeconomic Factors and Stock Market Return in Nepal

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I. INTRODUCTION

The stock market plays a crucial role in economic growth by mobilizing capital for investment. In Nepal, the stock market is relatively young and influenced by various internal and external macroeconomic forces. Despite its potential, NEPSE has shown high volatility, raising concerns about investor understanding of these macroeconomic influences.

This study aims to explore the trends and relationships of key macroeconomic variables with the Nepal Stock Exchange Index (NEPSE), offering insight for investors and policymakers.

II. RESEARCH PROBLEM

The Nepal Stock Exchange exhibits frequent volatility, partially driven by limited awareness of the macroeconomic forces affecting it. This research seeks to answer:

- What are the recent trends in macroeconomic indicators?
- How do these indicators correlate with and influence NEPSE?

III. OBJECTIVES

1. To identify the trends of selected macroeconomic indicators.
2. To examine the relationship between these indicators and NEPSE.
3. To analyze the impact of these variables on stock returns.

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IV. HYPOTHESES

H1: Broad Money Supply (M2) significantly impacts NEPSE.

H2: Inflation Rate significantly affects NEPSE.

H3: Policy Interest Rate significantly influences NEPSE.

H4: Exchange Rate (USD/NPR) significantly affects NEPSE.

H5: Industrial Production significantly influences NEPSE.

V. METHODOLOGY

Design: Quantitative research using time series analysis.

Period: 2014–2023.

Data Sources: Nepal Rastra Bank (NRB), NEPSE, SEBON, and Ministry of Finance (MOF).

Analytical Tools: Descriptive statistics, correlation analysis, and multiple regression.

VI. VARIABLES

Dependent Variable: NEPSE Index (proxy for stock market return).

Independent Variables:

- Interest Rate (IR)
- Inflation Rate (INF)
- Exchange Rate (ER)
- Industrial Production (IP)
- Broad Money Supply (M2)

VII. RESULTS AND DISCUSSION

Inflation and Interest Rate: These had a negative but statistically insignificant impact on NEPSE. **Exchange Rate and Money Supply (M2):** Showed positive and statistically significant impacts. **Industrial Production:** Positive influence, but statistically insignificant.

These findings suggest that among the variables studied, exchange rate and money supply are the most influential in determining NEPSE movements.

VIII. CONCLUSION

Macroeconomic variables significantly influence the Nepalese stock market. Particularly, broad money supply and exchange rate exhibit a strong and positive effect on NEPSE. The results underscore the importance

of monetary stability and foreign exchange policy in shaping market behavior.

IX. RECOMMENDATIONS

- For Investors: Monitor macroeconomic trends, especially exchange rates and money supply.
- For Policymakers: Formulate consistent monetary and exchange rate policies to ensure market stability.
- For Researchers: Explore additional variables such as remittance, political stability, and foreign investment in future studies.

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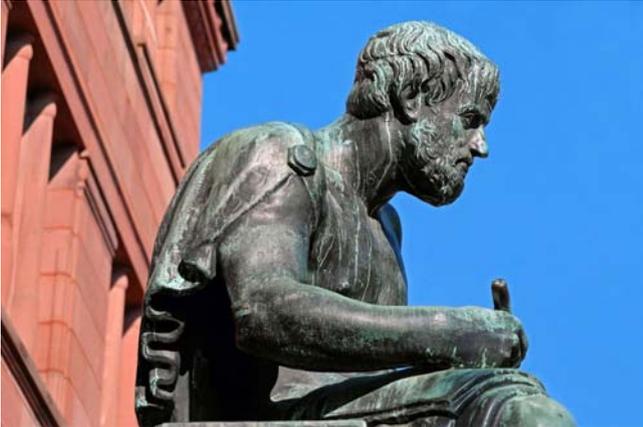
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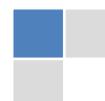
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The abstract is the foundation of the research paper. It should be clear and concise and must contain the objective of the paper and inferences drawn. It is advised to not include big mathematical equations or complicated jargon.

Many researchers searching for information online will use search engines such as Google, Yahoo or others. By optimizing your paper for search engines, you will amplify the chance of someone finding it. In turn, this will make it more likely to be viewed and cited in further works. Global Journals has compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Keywords

A major lynchpin of research work for the writing of research papers is the keyword search, which one will employ to find both library and internet resources. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining, and indexing.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy: planning of a list of possible keywords and phrases to try.

Choice of the main keywords is the first tool of writing a research paper. Research paper writing is an art. Keyword search should be as strategic as possible.

One should start brainstorming lists of potential keywords before even beginning searching. Think about the most important concepts related to research work. Ask, "What words would a source have to include to be truly valuable in a research paper?" Then consider synonyms for the important words.

It may take the discovery of only one important paper to steer in the right keyword direction because, in most databases, the keywords under which a research paper is abstracted are listed with the paper.

Numerical Methods

Numerical methods used should be transparent and, where appropriate, supported by references.

Abbreviations

Authors must list all the abbreviations used in the paper at the end of the paper or in a separate table before using them.

Formulas and equations

Authors are advised to submit any mathematical equation using either MathJax, KaTeX, or LaTeX, or in a very high-quality image.

Tables, Figures, and Figure Legends

Tables: Tables should be cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g., Table 4, a self-explanatory caption, and be on a separate sheet. Authors must submit tables in an editable format and not as images. References to these tables (if any) must be mentioned accurately.



Figures

Figures are supposed to be submitted as separate files. Always include a citation in the text for each figure using Arabic numbers, e.g., Fig. 4. Artwork must be submitted online in vector electronic form or by emailing it.

PREPARATION OF ELETRONIC FIGURES FOR PUBLICATION

Although low-quality images are sufficient for review purposes, print publication requires high-quality images to prevent the final product being blurred or fuzzy. Submit (possibly by e-mail) EPS (line art) or TIFF (halftone/ photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Avoid using pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings). Please give the data for figures in black and white or submit a Color Work Agreement form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

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TIPS FOR WRITING A GOOD QUALITY MANAGEMENT RESEARCH PAPER

Techniques for writing a good quality management and business research paper:

1. Choosing the topic: In most cases, the topic is selected by the interests of the author, but it can also be suggested by the guides. You can have several topics, and then judge which you are most comfortable with. This may be done by asking several questions of yourself, like "Will I be able to carry out a search in this area? Will I find all necessary resources to accomplish the search? Will I be able to find all information in this field area?" If the answer to this type of question is "yes," then you ought to choose that topic. In most cases, you may have to conduct surveys and visit several places. Also, you might have to do a lot of work to find all the rises and falls of the various data on that subject. Sometimes, detailed information plays a vital role, instead of short information. Evaluators are human: The first thing to remember is that evaluators are also human beings. They are not only meant for rejecting a paper. They are here to evaluate your paper. So present your best aspect.

2. Think like evaluators: If you are in confusion or getting demotivated because your paper may not be accepted by the evaluators, then think, and try to evaluate your paper like an evaluator. Try to understand what an evaluator wants in your research paper, and you will automatically have your answer. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

3. Ask your guides: If you are having any difficulty with your research, then do not hesitate to share your difficulty with your guide (if you have one). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work, then ask your supervisor to help you with an alternative. He or she might also provide you with a list of essential readings.

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6. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right? It is a good habit which helps to not lose your continuity. You should always use bookmarks while searching on the internet also, which will make your search easier.

7. Revise what you wrote: When you write anything, always read it, summarize it, and then finalize it.

8. Make every effort: Make every effort to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in the introduction—what is the need for a particular research paper. Polish your work with good writing skills and always give an evaluator what he wants. Make backups: When you are going to do any important thing like making a research paper, you should always have backup copies of it either on your computer or on paper. This protects you from losing any portion of your important data.

9. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several unnecessary diagrams will degrade the quality of your paper by creating a hodgepodge. So always try to include diagrams which were made by you to improve the readability of your paper. Use of direct quotes: When you do research relevant to literature, history, or current affairs, then use of quotes becomes essential, but if the study is relevant to science, use of quotes is not preferable.

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11. Pick a good study spot: Always try to pick a spot for your research which is quiet. Not every spot is good for studying.

12. Know what you know: Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

13. Use good grammar: Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice. Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

14. Arrangement of information: Each section of the main body should start with an opening sentence, and there should be a changeover at the end of the section. Give only valid and powerful arguments for your topic. You may also maintain your arguments with records.

15. Never start at the last minute: Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

16. Multitasking in research is not good: Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

17. Never copy others' work: Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

18. Go to seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

19. Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

20. Think technically: Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.



21. Adding unnecessary information: Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

22. Report concluded results: Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

23. Upon conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium through which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

INFORMAL GUIDELINES OF RESEARCH PAPER WRITING

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

The introduction: This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

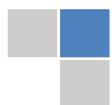
General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear: Adhere to recommended page limits.

Mistakes to avoid:

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.



- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

Title page:

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

Abstract: This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

Reason for writing the article—theory, overall issue, purpose.

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

Approach:

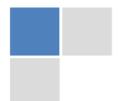
- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

Introduction:

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.

The following approach can create a valuable beginning:

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.



Approach:

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

Procedures (methods and materials):

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

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Materials:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

What to keep away from:

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.



Content:

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

What to stay away from:

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

Approach:

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

Figures and tables:

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

Discussion:

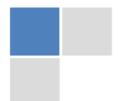
The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an argument should be.

Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."

Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

- You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- Give details of all of your remarks as much as possible, focusing on mechanisms.
- Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.



Approach:

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

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BY GLOBAL JOURNALS

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Topics	Grades		
	A-B	C-D	E-F
<i>Abstract</i>	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
<i>Introduction</i>	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
<i>Methods and Procedures</i>	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
<i>Result</i>	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
<i>Discussion</i>	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
<i>References</i>	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring



INDEX

A

Accentuated · 48, 53
Antiques · 6
Ardent · 39
Assert · 60

B

Behemoths · 60

C

Cadastral · 40, 51
Coherence · 7
Combat · 5, 7
Creeping · 42, 47, 51

D

Deductible · 53
Directing · 58

E

Eliciting · 59
Emerged. · 9
Enormous · 56, 65
Equilibrium · 2, 31, 32, 34, 35, 37
Eradication · 24
Erode · 30
Espionage · 7

G

Gauges · 26, 29
Gradient. · 41

I

Impede · 56, 64
Implicit · 44, 45, 46, 47, 48, 53
Insofar · 8
Intellectual · 7
Intercept · 34

L

Legitimate · 2

M

Mediterranean · 39
Merely · 8, 24
Merits · 7

O

Oligopolistic · 4

P

Paves · 51
Penetration · 26, 28, 29

Proponents · 7

Q

Quote · 2, 3

R

Refrain · 2
Regime · 40, 41, 53
Remittance · 22
Remuneration · 39, 44, 51

S

Scandinavian · 39, 41, 52
Sovereignty · 2, 3, 4, 5, 7, 8, 9, 10
Streamlines · 55, 56
Striving · 25

T

Tactics · 56, 59

U

Ulterior · 5

V

Validate · 32, 36



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