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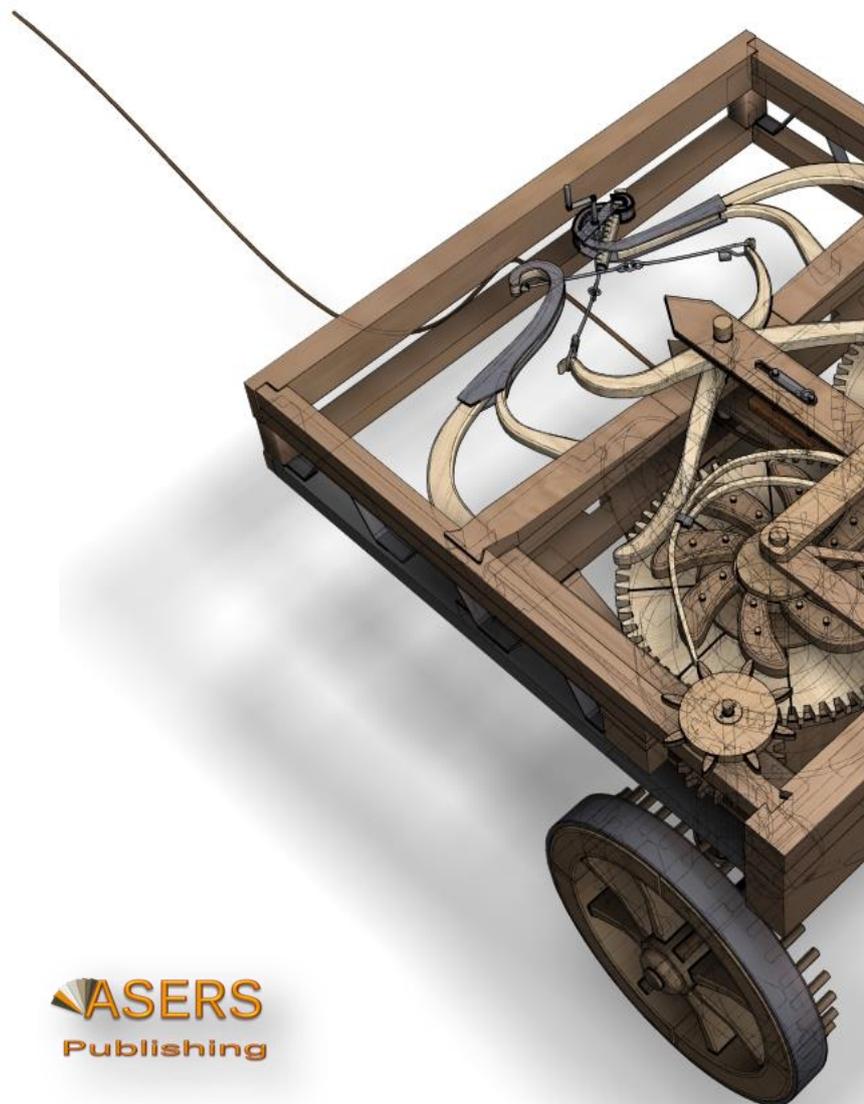
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Table of Contents:

| | | |
|---|--|--------|
| 1 | D. E. Watt's Reply for Keynes to Ramsey in the British Journal for the Philosophy of Science in 1989 is Defective Michael Emmett BRADY | ...109 |
| 2 | Russia. The Background of the Russian Invasion of Ukraine Hardy HANAPPI | ...116 |
| 3 | Macroeconomic Dynamics and the Role of Market Power. The Case of Italy Jasmine MONDOLO | ...130 |
| 4 | Modeling Commerce in Terms of Chemical Reactions Robert DICKENS | ...156 |
| 5 | Credit Liberalization Reform: A Simple Model Aleksandar VASILEV | ...163 |
| 6 | The European Monetary Integration Trap: Incomplete Sovereignty and the State-Mimicking Method Nazaré da Costa CABRAL | ...167 |
| 7 | Informal Sector and Institutions Muhammed Yusuf ÖZER | ...180 |
| 8 | Generalized Fisher Hypothesis Validity for Canada, UK, and Suisse Stock Markets: Evidence from Panel ARDL Models Malika NEIFAR, Fatma HACHICHA | ...188 |

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D. E. WATT'S REPLY FOR KEYNES TO RAMSEY IN THE BRITISH JOURNAL FOR THE PHILOSOPHY OF SCIENCE IN 1989 IS DEFECTIVE

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Abstract

D. E. Watt replied to Ramsey's attacks on Keynes's Logical Theory of, as originally contained in Keynes's A Treatise on Probability, in the January 1922 issue of Cambridge Magazine, in the republished British Journal for the Philosophy of Science version.

Watt overlooks that all 15 of Ramsey's paragraphs in the original Cambridge Magazine version of the paper are erroneous. Watt concentrates only on the issue of numerical versus non numerical probabilities that was raised by Ramsey. Watt is correct in his assessment that Keynes was right and Ramsey was wrong, but gives probability answers that would not have been given by Keynes, or Keynes and Russell. Watt overlooks the errors contained in each paragraph of Ramsey's review.

Keynes's main point on the issue of numerical versus non numerical probabilities is that many probabilities, especially initial or a priori probabilities, will have to be specified by interval probability. Keynes's Principle of Indifference (POI) has nothing to do with this issue, due to Ramsey's inchoate and erroneous understanding of the conditions Keynes laid out in the A Treatise on Probability for the sound application of the POI, as enunciated by Keynes on pp.52-56, and not on p.42, which is the Laplace -Bernoulli version of the POI. Sound applications of the Keynesian POI require that the alternatives must be a) discrete, b) indivisible, c) finite, d) represented by conditional probability, e) perfectly symmetrical, and f) based on the available, positive evidence. This, of course, rules out any application to states of equally balanced ignorance (no positive information). Of course, there will be only one answer that can be calculated by all rational decision makers. The obvious example is the first Ellsberg urn problem, which is nearly identical to the problem used by Keynes as an example on pp.75-76 of his A Treatise on Probability.

Keywords: nonnumerical probability; interval probability; imprecise probability; non-additive probability; relational; propositional logic

JEL Classification: D81.

Introduction

The paper will be organized in the following manner. Part II will examine some of the obvious errors in Ramsey's 1922 paper. Of course, the errors will only be obvious to a reader of the entire *A Treatise on Probability* (TP). The general failure of readers of the TP over the last 100 years to read the entire book led to the general acceptance of Ramsey's two critiques because the vast majority of

readers simply assumed that Ramsey had to have been right in his two critiques because he was a genius. Further, Keynes himself, Ramsey's mentor, had acknowledged that Ramsey was a genius.

Part III will examine Watts narrowly focused reply to Ramsey's attack on what Keynes called non numerical probabilities. Watt gives an incomplete answer that ignores Keynes's emphasis in the TP in chapters III, Part II, chapters XX and XXII of Part III, chapter XXVI of Part IV and Chapters XXVIX and XXX on inexact and approximate measurement, which was Keynes 's terms for interval probabilities. Part IV will conclude the paper.

1. The Many Errors in the 1922 Ramsey Cambridge Magazine Review

Bateman gives the following description of Ramsey's 1922 review:

"Ramsey's most noticed achievement (to date) by historians of economic thought is probably the open challenge he made to Keynes's *Treatise on Probability*, a criticism that first appeared during the second ten-week term of Ramsey's second year as an undergraduate in a short review published in the Cambridge Magazine (January 1922). Keynes had postulated that probability is an objective logical relation between two propositions; Ramsey denied that any such relations existed, completely undercutting the work that had taken Keynes roughly fifteen years to bring to fruition in 1921.

How did an eighteen-year-old undergraduate have the audacity to make such a critique and how had he been able to publish it? This is the story that Paul tells so well" (Bateman 2016, 182).

The relations that Bateman refers to above are, of course, the relations between sets of propositions involving premises and conclusions that Keynes defined as his *argument* form (pp.4-6, TP, 1921). Keynes's relational, propositional logic is identical in form to the Boolean relational, propositional logic that took the world's philosophers by storm in his 1854 *The Laws of Thought* (LT).Of course, Keynes's development, implementation and application of his *argument* form to probability led to major results in Part II of the TP that went far beyond Boole's results of his application of his original propositional logic to probability in chapters XVI to XXI in his *LT* in 1854.

Let us now take a look at the first two pages of Ramsey's article in 1922.The severe nature of the obvious errors should have warned readers right away that Ramsey simply did not understand what it was he was talking about:

"First, he (author's note-Ramsey is referring to Keynes) thinks that between any two non-self-contradictory propositions there holds a probability relation (Axiom I), for example between 'My carpet is blue' and 'Napoleon was a great general'; it is easily seen that it leads to contradictions to assign the probability 1/2 to such cases, and Mr. Keynes would conclude that the probability is not numerical. But it would seem that in such cases there is no probability; that, for a logical relation, other than a truth function, to hold between two propositions, there must be some connection between them. If this be so, there is no such probability as the probability that 'my carpet is blue' given only that 'Napoleon was a great general', and there is therefore no question of assigning a numerical value."(Ramsey 1922, 3;1989, 219-220).

First, nowhere in the *A Treatise on Probability* or anything written by Keynes in his lifetime did Keynes state, write or think"... that between any two non-self-contradictory propositions there holds a probability relation..." (Ramsey1922, 3).

Only those propositions that satisfy the structure of Keynes's argument form can have a probability relation of some degree that exists between them. That means that the propositions must be related to each other **and** contain relevant knowledge connecting the two (it is more accurate to say two sets of) propositions.

Second, there is no such axiom one "...Axiom I..." (Ramsey 1922, 3) asserted by Keynes existing in the *A Treatise on Probability* or in anything else written by Keynes in his lifetime.

Third, Ramsey's "...'My carpet is blue' and 'Napoleon was a great general'..." (Ramsey 1922, 3) example is directly ruled out by Keynes's argument form ,first specified on p.4 of *A Treatise on Probability* ,specifying that the h proposition(s),that form the premises of the argument, must contain relevant evidence upon which to base a conclusion ,a, so that $P(a/h)=\alpha, 0 \leq \alpha \leq 1$, where α is a degree of

rational belief because there is evidence supporting the conclusion and P stands for the logical, objective, probability relation that holds between h and a. Keynes's results on pp. 54-56 rule out any connection between propositions that are irrelevant to each other. 'My carpet is blue' is irrelevant to 'Napoleon was a great general' and 'Napoleon was a great general' is irrelevant to 'my carpet is blue'.

Given the fact that nothing Ramsey is talking and writing about on p.3 of his note has anything to do with Keynes's A treatise on Probability, the claim, that Ramsey destroyed and demolished Keynes's logical theory in 1922, is a claim that most likely can only be found among economists and philosophers who write about Keynes's views on probability despite never having read the *A Treatise on Probability*. How is it possible for Ramsey's review to be considered a "brilliant", "fine", "astute", and "meticulous" analysis of the *A Treatise on Probability* ?

In his July 1922 review of Keynes's *A Treatise on Probability* for the *Mathematical Gazette*, on page 120 in his star footnote, Bertrand Russell showed that all of Ramsey's examples of supposed logical errors are intellectually worthless because they are prevented from occurring by Keynes's relevance - irrelevance logic. They are also ruled out by Keynes's argument form requirements on pp.4-6 of Keynes's *A Treatise on Probability*.

It is easy to discern what Ramsey's fatal logical and epistemological errors were -his claim that Keynes's logic applies to *any two* propositions. Ramsey carries this nonsense definition through in both his 1922 article and his 1926 presentation that was published in 1931.

In fact, what one need to do to make any sense of Ramsey's definition is to replace "any two" with "some sets of". Ramsey simply invented in his own imagination that part of his definition about the 'any two' in "any two non-self-contradictory propositions..."

Fourth, Keynes would have, of course, concluded that no probability exists and not Ramsey's "and Mr. Keynes would conclude that the probability is not numerical."

Fifth, Keynes would have stated that it should be obvious that "... there is therefore no question of assigning a numerical value."

In conclusion, just concentrating on the first two paragraphs of Ramsey's 1922 review shows that he has made 5 serious errors regarding Keynes's application of his relational, propositional logic. That should have been enough to reject Bateman's claims in 2016 about Ramsey having challenged Keynes. The most extreme claim of Ramsey's is that Keynes's propositional relations do not exist:

"But let us now return to a more fundamental criticism of Mr Keynes' views, which is the obvious one that *there really do not seem to be any such things as the probability relations he describes*. He supposes that, at any rate in certain cases, they can be perceived; but speaking for *myself I feel confident that this is not true. I do not perceive them*, and if I am to be persuaded that they exist it must be by argument; moreover I shrewdly suspect that *others do not perceive them either, because they are able to come to so very little agreement as to which of them relates any two given propositions.*"(Ramsey 1926, [193]. In Kyburg and Smokler 1980, (2nd ed.), 27; italics added).

This quotation has been the mainstay of academicians [for example, see Bateman (1987, 1989, 1990, 2016, 2021a, 2021b), Braithwaite (1973), Misak (2020). See Arthmar and Brady (2017, 2018) for an early critique of Bateman], for over 100 years when they explain why they rejected Keynes's logical theory of probability. The quotation is based entirely on Ramsey's false belief that Keynes's theory allows any two non contradictory propositions to be analyzed. All of Ramsey's examples, in both 1922 and 1926 reviews, involves two unrelated and irrelevant propositions of the same type as used by Russell in his July, 1922 review as a counter example to Ramsey. The counter example is contained in a footnote on p.120:

"2+2 =4" and "Napoleon didn't prefer poodles "

Yes. Ramsey would be right to conclude that

"...speaking for myself I feel confident that this is not true. I do not perceive them, and if I am to be persuaded that they exist it must be by argument; moreover I shrewdly suspect that others do not perceive them either, because they are able to come to so very little agreement as to which of them relates any two given propositions."(Ramsey, *ibid.*, 27)

when he is talking about his own very flawed examples. Yes. One can agree that there *should be* little agreement about Ramsey's incorrect example problems, such as "my carpet is green" and "Napoleon was a great general." or "This is round" and "that is red" or "This is blue" and "that is red".

I have shown in a number of other publications that there is nothing correct on pp. 4-5 of his 1922 review. (See Brady 2004a,b, 2021a,b).

3. A Demonstration that Watt Accepted too much of Ramsey's Claims as Being Scholarly

Watt attempts to focus his reply to Ramsey on only one area of the dispute between Ramsey and Keynes -whether probabilities are always numerical or whether they can be non-numerical. Keynes uses the term "non numerical" to stand for his approximate, indefinite, inexact measurement approach using two numbers, an upper probability, limit or bound and a lower probability, limit, or bound. This approach was first technically worked out by Boole in 1854. What Boole and Keynes are using are interval valued probabilities requiring two numbers and not one. The modern approach for logical probability is provided by Hailperin in 1986. See Hailperin, 1965, 1986, 1996.

However, Watt overlooks most of the many errors contained in Ramsey's 1922 review. Consider Watt's statement below:

"Ramsey criticizes Keynes' contention that epistemic probabilities are not always numerical, comparing him to a surveyor who, afraid that his estimates of the heights of mountains might be erroneous ... said that heights were relative to surveyors' instruments, and when he came to a mountain hidden in mist he assigned it a non-numerical height because he could not see if it were taller or shorter than the other."

This is excellent rhetoric; it is only the philosophy which is poor. In the first place, Keynes does not use the possibility of erroneous probability assignments to prove either that probability is relative to evidence, or that probability is sometimes non-numerical. The passage (in 3.12) quoted by Ramsey in paragraph 5 makes no reference whatever to the possibility of having mistaken beliefs about probability. Rather, it makes probability relative to our (limited) knowledge, and knowledge obviously does not include our mistaken beliefs. In the second place, as regards the numerical nature of epistemic probability, Ramsey's analogy begs the question. It is obvious that mountains have numerical heights; ..." (Watt 1989, 223-224).

Watt makes some sound rebuttals to side points here but does not realize what the main point Keynes is getting at -probability is primarily interval because of missing /unavailable evidence. This missing/unavailable evidence is due to the fact that in the surveyor, heavy cloud cover/mist example, what makes it impossible to make a precise estimate is the cloud cover, so that we must go with an imprecise estimate.

Consider the following analysis of Watt which overlooks Keynes's clearly defined argument form (TP 1921, 4-6) and Keynes's clearly presented logic of relevance-irrelevance (TP 1921, 52-56):

"In chapter 3, Keynes cites various cases in which, he claims, probability is not numerical. Ramsey prefers to analyse these as cases in which no probability relation exists (2.3). Given a particular knowledge set K and proposition p , Ramsey seems justifiably more cautious than Keynes as regards accepting the existence of any probability relation, numerical or otherwise. For instance, let K be the knowledge set of a newly born baby, and let p be Goldbach's conjecture. Is it clear that $P(p/K)$ exists? If it does, this presumably has implications for the way a reasonable agent will regard the proposition.

But if K is the knowledge of a newly born baby, how should the agent regard p ?

The answer, of course, is that the agent does not regard p at all, so the question of how he should do so does not arise. In such a case it seems idle to speak of probability. We shall say that p is 'not a hypothesis relative to K '; 'not a

K -hypothesis'. Thus in what follows the term 'hypothesis' will be reserved for those cases where some probability exists-maximal, minimal, or intermediate.

In particular cases, then, Ramsey's caution in regard to the existence of a probability relation seems justified." (Watt 1989, 224).

Watt has dropped the ball here. He does not see that Ramsey's example of a green carpet and Napoleon on p.3 of Ramsey's paper makes no sense at all. What is blinding Watt here is his belief that Ramsey was a genius. Now Ramsey eventually developed into a genius, but he obviously was NOT ONE IN 1922. The propositions selected by Ramsey are both unrelated and irrelevant.

Finally, Watt errs in choosing a problem involving Keynes's Principle of Indifference (POI) that had been ruled out of bounds by Keynes because the assumption of continuity leaves to the generation of many, different conflicting answers. Keynes's POI, as discussed on pp.52-56, is applicable to discrete outcomes only.

"In contrast to Ramsey, I suggest that Keynes' examples are evidence for the conclusion that probability is not always numerical, and indeed for the stronger conclusion (also accepted by Keynes: see 3.8) that probabilities are sometimes not even comparable; that we can have knowledge K, and K-hypotheses H1 and H2, such that $P(H1/K)$ is neither greater than, nor equal to, nor less than $P(H2/K)$. I shall now offer a proof of this stronger conclusion by adapting an example from 4.6; intended by Keynes for a different purpose.

Define the specific volume of a substance as the density of water, divided by the density of that substance, and define the specific density of a substance as the density of that substance, divided by the density of water."(Watt 1989, 225).

Keynes had already shown in chapter III

"...that probabilities are sometimes not even comparable; that we can have knowledge K, and K-hypotheses H1 and H2, such that $P(H1/K)$ is neither greater than, nor equal to, nor less than $P(H2/K)$."(Watt 1989, 225).

involves the use of intervals. Consider the much more simpler and straightforward example below when compared to Watt's three pages of manipulation.

We can take $p1 = (.45, .55)$ and $p2 = (.50, .60)$ on evidence K. Then $p1$ is neither greater than, nor equal to, nor less than $p2$. See Keynes's numerous examples on pp. 22-34 of probabilities using upper and lower limits or bounds.

Watt overlooks the many other errors that permeate Ramsey's Cambridge Magazine review. There is not a single paragraph of the 15 in Ramsey's review that does not involve either complete or partial error.

Conclusions

The fundamental error committed by all 20th and 21st century academicians, who characterize themselves as being 'Keynes scholars' or 'Fundamentalist Keynesians', is their failure to read and absorb Part II of the TP. Having failed to absorb Part II, they are completely unprepared to grasp Part III, Part IV and Part V.

The bridge between Part I of the TP and Part II was Chapter V of Part I. Keynes makes it clear in a footnote on p.65 at the very beginning of chapter V that chapter V of Part I is the introduction (alpha) to Part II, particularly chapter 15(omega). Chapter 15 then leads to chapters 17, 20, 22, 26, 29, 30, and finally to chapter 32.

The republication of Ramsey's *Cambridge Magazine* article by the *British Journal for the Philosophy of Science* was a major mistake, similar to D. Moggridge's mistake as the editor of The Collected Writings of John Maynard Keynes (CWJMK) in allowing R. B. Braithwaite to publish an editorial foreword, placed at the front of the 1973 CWJMK edition of Keynes's *A Treatise on Probability*, that can only serve to severely mislead all potential readers.

The Watt response of 1989 is completely inadequate, as Watt concentrates on only one of Ramsey's many errors, which was his erroneous critique of Keynes's non numerical probabilities, by which Keynes meant that probability was primarily interval valued. Watt has no idea about what Keynes meant. His unfortunate resort to an application of Keynes's Principle of Indifference (POI) to a type of problem that Keynes made clear that his POI could not be applied to, which were problems involving continuity, demonstrates the point in a very convoluted and extensive exercise that overlooks that there

is a much, more simpler and direct example that can be used to show what Keynes was talking about, which Keynes makes crystal clear in Part II of the TP in chapters 15 and 17.

The historical result of the overwhelming acceptance of Ramsey's two reviews is that scientists, in general, erred in their belief that subjective probability was a superior foundation for issues and problems involving the use of probability and statistics in questions and problems that confront business, government and industry decision makers. Thus, what is now required, in light of the very large number of errors contained in both the 1922 and 1926 Ramsey critiques of logical probability, is a throughgoing, detailed, systematic reevaluation of Keynes' s logical theory as advanced by Hailperin.

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RUSSIA THE BACKGROUND OF THE RUSSIAN INVASION OF UKRAINE

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Abstract:

This paper presents an interpretation of the underlying dynamics of global political economy, which has led to the invasion of Ukraine by Russia in February 2022. It thus is an alternative to interpretations that view the individual psychological traits of Vladimir Putin as the driving force behind this event. To enable a more sensible account, it turns out to be necessary to go back in the history of the conflict between Russia and NATO to the times of the Cold War. Briefly, two important fields of methodology – a theory of power and game theory – have to be touched upon. Finally, the justified emotional disgust concerning Putin's aggressive war and the somewhat more detached scientific analysis are tried to be reconciled in the concluding paragraphs.

Introduction

On the 24th of February 2022 the Russian Federation, represented by Vladimir Putin as the leader of its ruling class, proved that it is determined to return to its Stalinist roots. By starting a full-fledged war on its ethnic neighbour, the Ukraine, it demonstrated that it considers aggregate coercive physical power, manifested by its army, as the preferred tool to extend its power, to extend its reach of dominance and exploitation. As one of the two leading countries with a well-developed police and military structure controlling the exploitation mechanisms of so-called state-capitalism, it obviously surprised many observers by its ruthless direct aggression, disregarding all possible alternative ways of international conflict resolution. In a sense this type of war politics is currently the culmination of what I have called the transition of integrated capitalism (in this case state-capitalism) to **disintegrating capitalism**¹.

There were early signs of this transition in the USA, see the attempt of Trump to become an autocratic ruler on the 6th of November 2021, but also in a more institutionalised way the constitutional changes in China and the RF were clear signs of a small autocratic elite in each of these empires to cement their position, to eliminate all democratic feedback mechanisms standing in their way. But while Trump failed (it remains to be seen if he can return at the next election), and the transitions in China concerned above all the implementation of high-tech surveillance systems, the outbreak of brutal military aggression in the Russian case is a new quality. It brings the global political system of disintegrating capitalisms on the verge of World War 3.

But is it correct to call the emergent class rule of a small autocratic elite 'capitalism', 'disintegrating capitalism'? To answer this question a brief review of the concept 'capitalism' is

¹ Compare (Hanappi, 2019a, 2020a)

necessary: Capitalism is a form of social organisation of society that enables **exploitation**, exploitation of *nature by man* as well as exploitation of *man by man*. While the former is the very basis of the ability of the human species to dominate life on earth, the latter is the general condition for the dynamics of class structures within human societies. What had happened in the last 500 years is a transformation² of one such class structure, namely feudalism, into another class structure, namely capitalism. Thus, capitalism is a particular form of exploitation of one group of classes by another group of classes. The characteristic of this structural form is its dialectical interaction between (1) the entrepreneurial innovation activity of capitalist owners of the means of production and (2) the increasing gap between the exploited classes and the exploiting classes. Innovation enables higher labour productivity (more leisure time with the same number of products) and the introduction of new utility dimensions. This feature of capitalism has been called its *historical mission*. But the exploitative nature of capitalism at the same time leads to an allocation of the fruits of its historical mission in the hands of the exploiting classes. This is why the gap in wealth and income between the antagonistic classes increases. In the 20th century attempts to integrate parts of the exploited classes into the global capitalist process occurred, though brutally interrupted by fascist regimes, which replaced capitalist processes by direct coercive exploitation carried out by a hierarchically structured military (and police) class. The **power**³ of this class combined direct physical, coercive power with the use of ideological power, a form of power that was substantially enhanced by new information technologies (broadcasting). After the breakdown of classical Fascism in 1945 a new wave of integrated capitalism in the Western hemisphere started to flourish. But since 1919, at least since the takeover of Stalin in 1924, the Soviet Union experienced a substantially different type of state development. There, power remained firmly in the hands of a small group of Bolsheviks, of militarists that excluded members of the ordinary working class and streamlined the social organization of society according to their needs. They constituted a new exploiting class. As Stalin had announced, the goal was 'socialism in one country', in fact a misuse of the original use of the concept 'socialism' in the 19th century. As George Orwell has described satirically in his political satire 'Animal Farm' in 1945, the Soviet society had become an exploitative class structure. The power of the exploiting class was cemented by direct military and police force, democratic feedback loops were reduced to a minimum. This was the birth of a system that I have called Stalinist production system, (Hanappi 1992), a system that prevailed till 1990.

1. From 1945 to 1990

After 1945 the victorious **Western Alliance** experienced a second wave of integrated capitalism (the first wave appeared in the interwar period). With respect to macroeconomic policies this usually is dubbed as a period of dominance of Keynesian policies. It allowed the domestic working classes in rich Western countries to achieve better education levels, higher income shares, more secure employment conditions, and a voice in government decisions concerning domestic affairs⁴. But with respect to international relations no sign of integration occurred, quite the opposite took place: From the Cold War of the 50-ties to the Korea Crisis, the Cuba Crisis, and finally to the disaster in Vietnam a bipolar world was continuously moving along the possibility of a third World War. It is remarkable that the Vietnam War – the attempt of the US army to keep a military stronghold on the continent of Russia and China – was led by a US president of the democrats, J.F. Kennedy, and in the end faltered due to the socially progressive movements in the domestic economy, the anti-Vietnam movements. This was a clear sign

² Transformations are characterized by a combination of slower modifications interrupted by sudden revolutionary pushes, compare (Hanappi and Scholz-Wäckerle, 2017).

³ A more formalized approach to the concept of power is provided in appendix A.

⁴ This evidently was the time when European social-democratic parties became carriers of social progress and could make their mark as the political force offering a worker-friendly capitalist alternative to Stalinism. In the USA the democratic party assumed a similar strategy, e. g. by taking a stand against racism.

that in the early 70-ties integrated capitalism in rich Western countries had gained considerable strength⁵. A whole generation of young people was socialized during that period.

In the **Eastern hemisphere** the opposite development occurred: The revolt of the Hungarian population in 1956 and the rebellion of the Czech Spring in 1968 were brutally knocked down by Russian tanks, by Stalinist political practice. Again, a whole generation was socialized in a very specific political atmosphere of oppression of civil life, oppression that visibly had its root in Stalinist Russia. It is this experience of 45 years of being oppressed by the Russian ruling class, which explains why the large majority of the population in Eastern European countries see their independence from Russia as a **progressive social revolution**. Economically the exchange of products between Russia and its Eastern European satellite states typically concerned Russian oil and gas for Eastern European products manufactured with a better trained workforce, e. g. in Eastern Germany or Czechoslovakia. Since the Cold War foreign policy of the Eastern bloc first did not change much. Only when the West started its long journey towards a restauration of conservative roll-back, abolishing Keynesian politics, reversing integrated capitalism, i. e. when Ronald Reagan, Thatcher and Kohl became heads of state, only then a slight change in Eastern regimes started.

There are many different reasons why in 1990 the Soviet Union ceased to exist. One of them certainly is the lack of innovative power – technologically as well as socially - that a military regime and its command economy necessarily implies. Only the sectors important for its military force, e. g. weapons industry related research, were pushed. Another reason is the vulnerability of a strict hierarchical organization: Once the top decision-maker(s), e. g. president Gorbachev and his follower Boris Yelzin, tended to give up a strict streamlining of the regime, it could be expected that the whole pyramid below them will fall. Gorbachev later turned out always to have been closer to social-democratic ideas and Yelzin was even more attached to 'Western' ideology. Finally, the generally depressive mood in the Russian population confronted with stagnating welfare, corruption and complete lack of democratic feedback control surely also played a role in the silent disappearance of the Soviet Union. On the 31st December of 1999 Putin took over the leadership of a Russian Federation that had lost its role as the second large global power.

When the Soviet Union imploded and was replaced by the Russian Federation the strength of the exploiting class in Russia was severely reduced. Of course, the military circles maintained their overarching control – Russia remained a police state with a strict command-oriented economy. But it had to adjust to a considerably stronger world economy within which its interaction – the transformation of its exploited surplus into the world currency of US Dollars – had to be managed. Partly the respective top level of the military hierarchy could take care of this business, partly a group of newly emerging **oligarchs** was able to make its fortunes. As a member of globalized capitalism Russia, like China after Teng Hsiao Ping, was acting like any other capitalist state. The major difference of the two state-capitalist regimes in Russia and China was the way in which their internal social organisation was organised: they were, and still are, police states – a military elite controls all social relations. In Russia as well as in China a group of extremely rich oligarchs complements - nourishes and is nourished by – the leading military that directs politics. It is thus justified to consider these state-capitalist countries as examples of disintegrating capitalism. The dominance of the military-industrial complex in the USA and its complement of **super-rich billionaires** works in a similar way, and is just another manifestation of disintegrating capitalism. When Trump's rioting mass tried to capture power with their run to the capitol, they were trying eliminate the last democratic feedback loop that usually still exists in the Western hemisphere. Luckily, this last step towards the authoritarian endpoint of disintegrating capitalism has been prevented.

Having sketched the trajectory from integrated capitalism in the West towards disintegrating capitalism approached by the three large empires (USA, China, Russia)⁶ in the last decades, it is

⁵ In Europe this was the high tide of two-party coalition governments (in Austria even a social-democratic government) led by social-democracy.

possible to highlight some more recent features. These considerations are important to evaluate Putin's last move, 'last' in a double sense.

2. From 1990 to the War of 2022

But before going into these details the growth of the military structure of the Western hemisphere, of NATO, has to be brought into the picture. NATO was founded in 1949, mainly motivated by the intention of US president Harry Truman to prevent the extension of the Soviet Union in Greece and Turkey⁷. Today NATO consists of 30 member states sending their representatives to the North Atlantic Council, which is the top decision council. All top **military decisions** are taken by the Chiefs of Defence (CHOD) of the member states, actual control of military operations has the **Supreme Allied Commander Europe** (SACEUR). Since May 2019 this position is held by the US general Tod D. Wolters; this position is **always to be assigned to a US general**. In reaction to the founding of NATO in 1949 the Soviet Union and seven other Eastern European states founded the military alliance called the **Warsaw Pact** in 1955. It ended in December 1990 when the USSR was declared dissolved. To see how dominant military expenditure of the USA is in the world, one could compare the US share in total military expenditure of all countries in the world⁸ in 2020 (40,3 %) with the corresponding share of Russia (3,2 %), China (13,1 %), and Germany (2,7 %). This explains why the US clearly is in a position to guide the decisions of NATO.

In the 90-ties, after the collapse of the Soviet Union, the basic strategic framework of NATO changed. While the Cold War was based on a static game theoretic framework, a model in strategic form, which highlighted that a limited, simultaneous build-up of nuclear weapons on both sides – USA and USSR – can lead to an '**equilibrium of deterrence**', the new doctrine that became fashionable was based on a repeated game in extended form⁹, which rather implied **perpetual disequilibrium**. The first US president, who after some time of hesitation subscribed to this new strategy was Bill Clinton, interestingly enough again a democratic president. In 1997 George F. Kennan, one of the famous designers of the Cold War strategy notes in his diaries:

That the Russians will not react wisely and moderately to the decision of NATO to extend its boundaries to the Russian frontiers is clear. They are already reacting differently. I would expect a strong militarization of their political life, to the tune of a great deal of hysterical exaggeration of the danger and of falling back into the time-honored vision of Russia as the innocent object of the aggressive lusts of a wicked and heretical world environment.

(Kennan, 2014, chapter 1997)

Despite the influence of political heavyweights like Kennan the USA via their military vehicle NATO continued to extend their military reach. The timeline of NATO's successes is telling:

1949: Founding Members:

Belgium, Canada, Denmark, France, Iceland, Italy, Luxembourg, Netherlands, Norway, Portugal, United Kingdom, United States

Enlargements

- 1952: Greece, Turkey
- 1955: Germany
- 1982: Spain
- 1990: Germany
- 1999: Czech Republic, Hungary, Poland
- 2004: Bulgaria, Estonia, Latvia, Lithuania, Romania, Slovakia, Slovenia

⁶ The thrive towards authoritarian regimes that are built on police states can be observed in smaller countries in the semi-periphery too, e. g. Turkey, Hungary, Brazil, etc.

⁷ The so-called *Truman Doctrine* had the primary goal of containing Soviet geopolitical expansion during the Cold War. Its final form was presented to the US Congress on July 4, 1948.

⁸ Data extracted from the SIPRI database www.sipri.org.

⁹ Compare appendix B for some details of the involved game theoretic models.

- 2009: Albania, Croatia
- 2017: Montenegro
- 2020: North Macedonia

It is visible how the speed of advance of NATO towards the East increased after 1999. From 1990 to 1999 Russia's domestic economy did not only frustrate foreign investors, this decade also was marked by the constitution of a new ruling class, which to a considerable amount consisted of individuals that already had been in power before 1990, supplemented by what later had been dubbed '*new oligarchs*'. President Yelzin, supported by his circle in the ruling party and in the military leadership, had to accept that in Afghanistan – a country under Soviet influence since 1979 – the US-supported Taliban took over power. After 1996 US troops themselves, forcing the Taliban out of the country, came close to the border of the former Soviet Union satellite states of Turkmenistan, Uzbekistan and Tajikistan. Yelzin thus came under severe pressure from the South. Also Taking place in the South of Russia, the first war against Chechnya, started by Russia in 1994, in the end was not successful. The peace of 1996 was only short-lived, Chechnyan terrorism continued, in 1999 a second war started. In the eyes of the new ruling class the presidency of Yelzin was a period of failure and complete loss of the superpower status the USSR had achieved in WW2. This was the situation when from 2000 onwards Vladimir Putin entered the stage.

At the turn of the millennium the working of the world economy had somewhat settled in the new hegemony of US-led global capitalism. The old doctrine of 'economic motives in the long-run will always win over short-term political resistance' allowed to start the transformation process of Eastern European countries on a slower, but sustainable pace. The vehicle of this *economic* integration was the extension of the **European Union**. But as was already visible in the founding years of the EU, this economic integration process was designed to take place under the military umbrella of US-led NATO. Military forces in Western European countries always *were already* integrated in hierarchical command structure of NATO. The political independence of Western European states was limited by the fact that their political ambitions by and large had to comply with the strategic goals of NATO. In the old Western states this room to move included a two-party system in which the social-democrats were a kind of insurance against too left-leaning influences of workers¹⁰. In Eastern European member states of the EU such a soft frontier was not necessary: The strong anti-Stalinist mood in the population lived on even though the blessings of capitalist welfare did not materialize. If popular frustrations reached the surface of public policy at all, then they were channelled in newly emerging nationalism, e. g. Hungary and Poland. As a consequence, EU extensions rather smoothly could go hand in hand with NATO extensions.

In Europe, US military hegemony implied – and was nurtured by – economic hegemony. Nevertheless, Eastern EU members soon played a particular role. In these countries the national ruling classes were a mixed group of newcomers to the rich table of global exploitation schemes¹¹. In their own countries exploitable opportunities remained limited, seventy years of Stalinism had frozen productivity growth. Some clever young entrepreneurs had taken the chance of 'go west young man' and had left. What remained often were sly bureaucrats aiming at subsidies from Brussels, sometimes ganging up with semi-criminal circles. For the EU Eastern Enlargement slowly became a problem. Not so for NATO. Its latest territorial expansion was Montenegro, becoming a NATO member even before it became a member of the European Union.

The split between a military layer and the economic layer was not occurring in Putin's Russia. In a Stalinist regime the ruling class controls both simultaneously – and it does so by a hierarchical command structure. Of course, Putin noticed the change in the strategy of NATO (compare appendix B). But there was not much he could do. To see that NATO easily could destabilize, and in the end destroy Yugoslavia, split it up into many powerless little states, install a new (Albanian) state, Kosovo, just close

¹⁰ A borderline case was the government of Alexis Tsipras in Greece in 2015.

¹¹ An interesting case is the Czech Republic, which in some areas managed to squeeze in between semi-finished products imported from Asia and the consumer markets in richer Western European states.

to the remaining ally Serbia, all this served him as an example for a successful intervention via a mixture of quick military force and coordinated media policy - and cleverly circumvention of United Nations consent. In a similar way he viewed the political tactics of Donald Trump as adorable. Strike with full direct force if possible and always accompany your atrocities with a media campaign full of wild and ruthless lies. It also is quite telling that the last friendly visitor of Vladimir Putin just before he started the war in Ukraine was Viktor Orbán, another leader subscribing to this new autocratic style.

The tactical move to equip local rivals in an intended goal of conquest with weapons, so that they would produce a chaotic situation, which then could be used by the truly conquering state to 'bring peace'; this tricky game was played by the US in the Middle East several times too. In a somewhat more hidden way Putin tried to imitate this tactic by supporting the extreme right in Western European states. Of course, he was not able to produce a military shake-up, but at least some political turmoil, e. g. in France, Germany, Italy and Austria, was possible. And evidently, he had recognized that the Eastern advance of NATO was starting to play this game in Ukraine in 2014, replacing the 'neutral' friend of Russia, Yanukovich, by the Western ally Poroshenko. In Western media this event was called the Maidan Revolution. And this was justified as far as for the Ukrainian population it indeed seemed to be a promise to approach Western welfare standards. But from 2014 to 2022 this promise did not materialize. As in the other earlier cases in Eastern Europe a highly corrupt ruling class kept the Ukrainian population as poor as possible¹². But in 2014 the strategy of NATO did not work: As an immediate answer to the Maidan Revolution Russia occupied the Crimea to secure its access to the Black Sea (the Southern and Western shore were already lost to NATO; Romania, Bulgaria, Turkey) and supported the separatists in two eastward provinces. The advance right to the border of Russia had led Putin to change his strategy.

In the Middle East Russia could keep its access to the Mediterranean Sea via Syria, the regime in Iran is endangered but not fallen yet, the complicated warfare between the USA and Russia got stuck in a stalemate. In the Far East NATO had been advancing too. Against the rise of China as a new superpower the US, UK and Australia had built the new military alliance AUKUS. From Russia's point of view this increase of hostilities against China should motivate Xi Jinping – the representative of China's ruling class, which had developed a similar form of state capitalism – to tolerate Russia's military interventions in the Ukraine. Moreover, military interventions, the use of brutal direct coercive force, has always been the instrument of choice in Stalinist regimes. But as the reaction of NATO and a newly united European Union quickly showed, the war on Ukraine fires back on the Stalinist regime in Russia. The ruling class in Russia is still controlling much of the public opinion. The grip of military and police on the civil society still exists. But banning Russia from the participation in the fruits of global welfare increase will stir up unrest in the Russian population in the mid-run. And China, which had advanced domestic electronic control and had diversified its funds – both, financially and politically - all over the world, China soon will moderate its support for Russia.

The fate of Putin and his generals is not clear yet. With respect to military force Russia cannot compete with NATO, in the meantime even China is stronger than Russia. It therefore was unwise to play the military card. In the West a bigger problem is the emergence of disintegrating capitalism, above all in the USA. New nationalism, the takeover of state power by small military-based elites, is not just a phenomenon that occurs on the capitalist periphery only. Disintegrating capitalism is moving to the centre stage. The fall of Putin's regime could be a sign of the fragility of such regimes. If this does not happen in the near future, it only will take a bit longer – but it is inevitable. Only then a new Russia can flourish.

3. Some Implications

When a few months ago, Joe Biden said that 'Putin is a killer', many observers thought that this is an exaggerated expression owed to necessary rhetoric of internal US politics. Since the 24th February of

¹² Data shows that in 2021 Ukraine had a GDP per capita of 13.943 US \$, the lowest in Europe. Germany had 56.956 US \$ and even Albania had 15.225 US \$.

2022 it is evident that Putin's decision to invade Ukraine indeed has killed many thousand people – and it has also **killed the belief that the Russian government has finally overcome its Stalinist roots**. The bleeding wound of a fierce war taking place in Europe provokes the immediate wish to stop this war, to enforce a ceasefire. But as I am writing these lines the just carried out brief analysis (including the appendices) shows that this wish will not be fulfilled. The **fight in Ukraine will go on for many weeks**, until Putin and his circle consider their 'military intervention' to be a successful 'limited conflict'.

Despite the fact that success is not guaranteed – Ukrainian resistance is not broken yet – it is highly questionable what success of Russia finally would mean. It will be difficult to keep the country occupied, an artificially installed new government will need many Russian soldiers to keep a permanent Guerrilla movement at bay. In the somewhat **longer run the invader's fate** probably will resemble the fate of the **USA in Vietnam**, or **Russia in Afghanistan**. So, far from having consolidated the sphere of influence of the current Russian government, Putin will be confronted with isolation and worldwide hostility. The current wave of anti-Russian sentiments is just a first taste.

To wake up **left-leaning intellectuals** – in the West as well as in the East – by showing them that Stalinism is not dead, that it still can raise its ugliest face, *i.e.*, brutal coercive warfare, has been an unintended consequence of the Putin's military strategy. It now is only too explicable why there is such a tight connection between Putin's circle, Donald Trump's entourage and all the other leaders of the extreme right in Europe. Their common enemy is democratization. But to build their empires they also need larger parts of the population. To get them as supporters their only strategy can be to **implant a superficial social identity** that splits off a large enough part of the total population. This identity usually is based either on older **religious divergences** (e.g. in the Middle East) or on **archetypes of nationalist ideology**¹³. This, of course, leads back to Stalin's strange mixture of 'national communism', 'socialism in one country', etc.

The accelerating turn of global capitalism into divergent streams of disintegrating state capitalism **leads to wars**. In an age of **rising alienation** (due to uncontrolled – and at the same time overcontrolled – information power) rather **chaotic public reactions** have to be expected. A sea of **diverging interpretations** of what is going on is already swapping on the shores of European perception. But there always are some clarifying aspects in this process too. Some humans can **learn from their history**, others don't. The community of the learning part¹⁴ might be able to survive. **The Russian invasion of Ukraine did teach us a hard lesson**.

¹³ Needless to mention that this was already the trick of classical national socialism, also known as fascism.

¹⁴ In (Hanappi, 2020b) I have labelled this group the global class of organic intellectuals.

Appendix A - Power

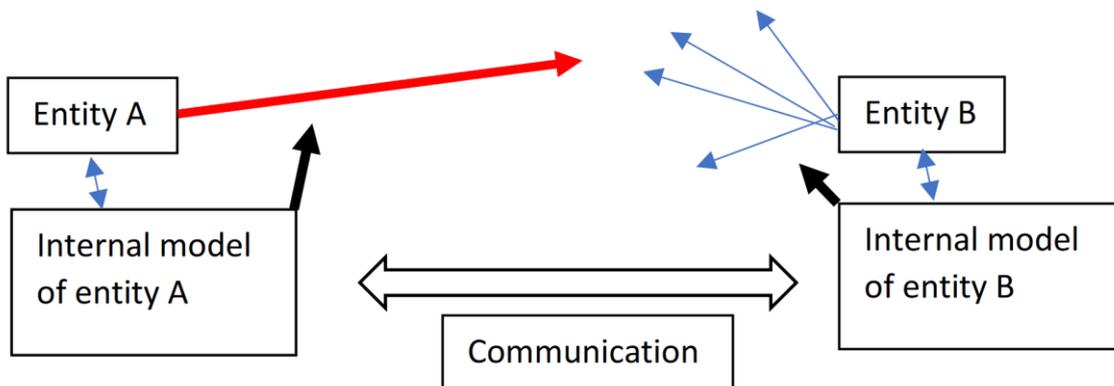
In its most rigorous form, the concept of power describes a relationship between two entities¹⁵. Entity A has power over entity B if it can influence the set of possible actions that B can choose to take.



With its action, symbolized by the red arrow, entity A can exert power on entity B by making it impossible for entity B to choose one of the three upper actions, symbolized by three blue arrows. Only the lowest blue arrow now can be chosen by entity B.

Several important amendments are necessary to appreciate this scarce characterization of power.

First, power comes in two forms: **direct coercive power** and **information power**. Direct coercive power means that physical force is applied to make actions of the opponent impossible. Information power is a more subtle tool, which often is combined with direct coercive power: Entity A says to entity B ‘If you are not willing to restrict your action set to the lower blue arrow, then I will use direct coercive power to force you.’. If information power works, then direct coercive power is not necessary. Moreover, entity B will store the successful threat of entity A in its memory and eventually will be easier to convince in the case of a repetition of the event in the future. From a more general perspective information power always presupposes those entities maintain internal models of the situation and are able to communicate (send and receive) internal models.



Note also that the set of possible actions is constructed with the help of the internal model of an entity, symbolized by the thick black arrows. Influencing the internal model of the opponent therefore can change the situation dramatically. With such manipulations possible options can be hidden, or not feasible options that will fail can be constructed. To construct a reliable characterization of a certain power relation is extremely difficult since internal models rarely are accessible to the scientist.

Second, power relations usually are **two-sided**. While there usually is a dominantly powerful entity, there rarely is a completely powerless opponent. In this respect the time structure of power dynamics is of particular interest. Economic dynamics are working slowly but steadily, while politics – including warfare – are fast actions. ‘Politics is just concentrated economics.’ has been a widely used

¹⁵ Quackenbush, following (Dahl, 1957, pp. 202-203), classifies this a relational definition of power (Quackenbush, 2015, p. 97). His critique that this type of definition can only be empirically determined after power has been exerted confuses the application of a theoretical construct (following Kant a ‘synthetical judgement’) with its theoretical usefulness (an ‘analytical judgement’).

slogan. Introducing a certain tax regime is a sudden political change, but how it will work out for the welfare of a society will take much longer. A political burst of discontent in a country will set free a number of more or less direct coercive measures – usually centralized via the monopoly of coercive power of the state – but what will be the economic consequences will only turn out much later. Since groups in society still are best characterized as classes, this process can be called the **dynamics of global class struggles**¹⁶.

Third, as societies grow and relationships and interdependencies are getting more and more most mutual power relations were becoming **institutionalized**. That is, they are fixed with the help of a law system, which is enforced by a coercive power monopolized by the police of a state. Though there is a slight flexibility provided by a system of judges, severe changes of the law system are hard to bring about. This development clearly gives the set of power relations a kind of neutral flavour. The advantage of the institutional solution certainly is that it streamlines expectations, it can be predicted what is a legal type of power exertion. On the other hand, the institutional apparatus itself often can react only slowly. In particular with respect to the influence of modern information power the law system typically is years behind the actual development in this field. Even more important: an institutionalized solution to a conflict can only fix a currently prevailing 'balance' of power. If there is an implicit permanent shift of the power relation, then the institutionalized handling sooner or later will have to break. In a more optimistic vein such a stepwise improvement of institutionalized power handling can be viewed as the way in which **democratic progress**, 'civilization' development, proceeds. It is this third amendment to the characterization of power relations, which shows where the development of Russia's society has failed. The elimination of effective democratic feedback loops within the Bolshevik party by Lenin had been a necessary measure for the success of the revolution in 1917. But to keep this feature as a doctrine for cementing the power of the new ruling class turned out to be the **core of Stalinism**. It makes obvious that that Stalinism is **incompatible with democratic progress**.

¹⁶ Today the concept of class needs to be reframed to take into account the global structure of production (value chains) and the tremendous influence of modern information technology, see (Hanappi, 2019).

Appendix B - Game Theory

The strategic questions of mutual deterrence had become a central topic as soon as after the end of WW2 the bipolar setting of global powers, the USA and the USSR, turned into questions of a nuclear conflict that could imply the extinction of the human species. It was John von Neumann himself, the inventor of game theory, who early on thought that his theory of strategic games could help to clarify the involved strategic issues. He had some influence on President Eisenhower and was said to have given some strategic advices based on game theoretic insights, e.g. that it would be wise to eliminate China because two-person games are more stable than three-person games, or that a pre-emptive nuclear strike against the USSR would be a preferable strategy. Fortunately, President Eisenhower did not follow these recommendations; von Neumann's genius in so many scientific disciplines evidently also was accompanied by some shortcomings in the area of social sciences. Since he never proposed an explicit model on nuclear deterrence on which his advices had been based, this always will remain unclear.

The followers of von Neumann, who used game theory to study the possibility of a stable equilibrium of powers based on the mutual threat of a deadly retaliation started with two archetypes of simultaneous-move games in strategic form¹⁷: the prisoners' dilemma¹⁸ and the chicken game¹⁹. It soon turned out that in a prisoners' dilemma the pivotal element of retaliation cannot be adequately presented – there must be a first move on which to retaliate, which in a simultaneous-move game cannot be described. Most of the following models thus were based on extensions of the chicken game. To capture the notion of assured retaliation these models included the acceptance of a contract on *Mutually Assured Destruction* (MAD) – the acronym is said to mirror von Neumann's cynic type of humour – each superpower should maintain the capability for immediate retaliation if the other attacks first. Based on such a stable game theoretic setting of mutual deterrence a nuclear conflict in the times of the Cold War could be avoided – at least this could be seen as a theoretical model describing rational decision-makers, which explains the actual empirically observed nuclear peace²⁰.

Soon after 1990, when the USSR had disappeared, the focus of game theoretic modelling shifted too. The maintenance of equilibrium between two similarly powerful hemispheres was substituted by the study of the possibilities of 'limited warfare' that a so-called 'challenger' could initiate to improve its position vis-à-vis a weaker 'defender', compare (Kilgour and Zagare 2007). It is not too far-fetched to relate these theoretical considerations to the advance of NATO towards the East that occurred from the war in Yugoslavia onwards.

These models usually are formulated as repeated games in extensive form. An interesting example comes from (Kilgour and Zagare 2007, 68). Here the 'challenger' is assumed to be discontent with the status quo with a probability x - just like NATO was discontent with its limited influence in Yugoslavia and Eastern Europe. If the 'challenger' now advances ('defunct'), then the 'defender' has three options: concede, defy, escalate. If 'concede' is chosen, then the challenger has a cheap win. In the case of 'defy' a further round of the game is needed in which the 'challenger' now can choose 'defy' and can lead a 'limited conflict'. But at this stage the 'challenger' could as well have chosen to 'escalate'. In the latter case the 'defender' gets a final choice between "defy" and 'escalate'. If then the 'defender' chooses 'defy' he loses, otherwise an all-out Conflict occurs. If the 'defender' already escalates in the first round and the 'challenger' retaliates with escalation, then all-out Conflict is happening too. Only if

¹⁷ In older texts the strategic form sometimes is called the 'normal' – though there is nothing particularly normal in this presentation. The form that explicitly shows the time structure of moves is called extensive form.

¹⁸ See (Rapaport, 1970, pp. 45-92) for a good description of the prisoners' dilemma game.

¹⁹ This game as well as a brief introduction of its use in models of nuclear conflict can be found in (Ferreira, 2020, pp. 5-7, 178-182).

²⁰ An interesting extension of such a model that softens the binary choice between cooperation and defunct was provided by (Brams and Kilgour, 1985, 1987). By introducing a quantitatively determined level of cooperation 'optimal deterrence' can be calculated.

the 'challenger' defies in the second round – after the defender has escalated – only then the escalation of the 'defender' wins.

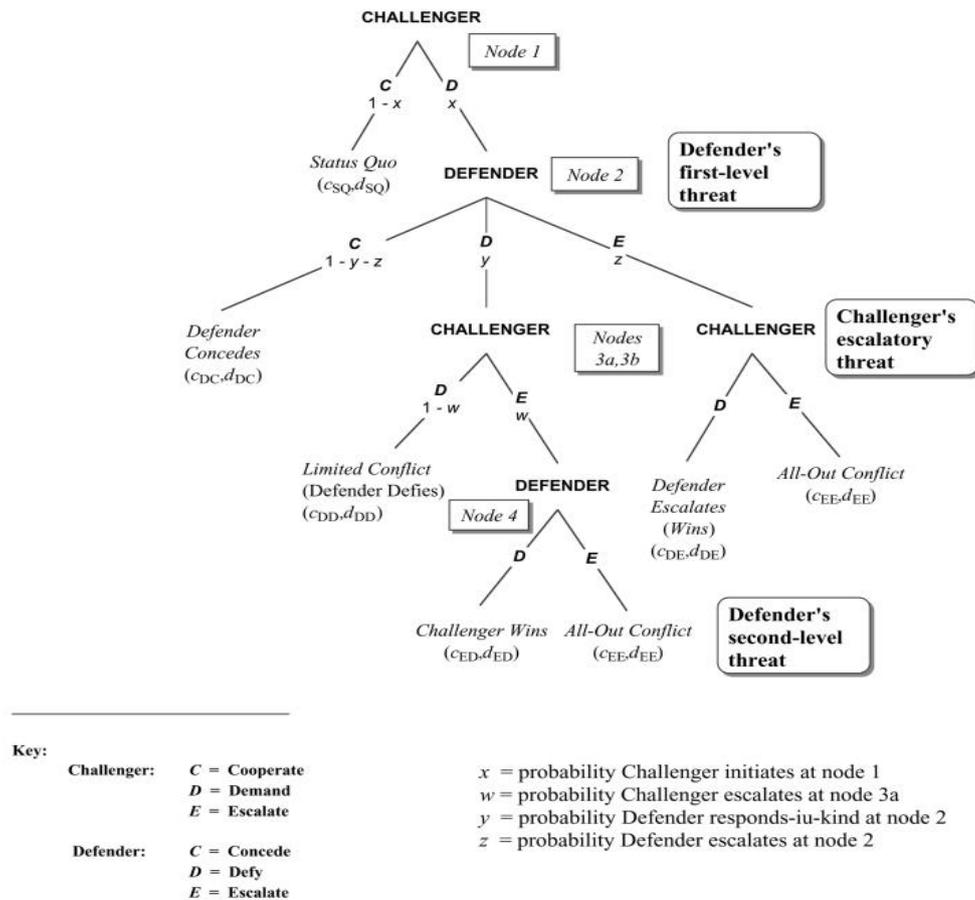


FIGURE 1 Asymmetric escalation game.

To solve this game by backward induction some assumptions on the values at the nodes of the game tree are necessary. They are made as follows:

$$\text{Challenger : } c_{DC} > c_{SQ} > c_{ED} > c_{DD} > [c_{EE} \text{ and } c_{DE}]$$

$$\text{Defender : } d_{SQ} > d_{DE} > [d_{DD} \text{ and } d_{DC}] > [d_{EE} \text{ and } d_{ED}].$$

The conditions for limited conflict can then be derived and in a concluding note the authors note 'that the escalation game we postulate is rather inimical to peace. Challenger always has an immediate incentive to upset the status quo, ...' (Kilgour and Zagare, 2007, p. 80). Their modelling approach, of course, does not refer directly to NATO enlargements, they rather find historical examples in the more distant past²¹.

It is clear that Putin and his military-oriented circle always have been keen observers of all theoretically oriented new research of game theory in this field. And it cannot be denied that from their perspective in the last 25 years Russia has been mainly in the role of a 'defender'. With each instance of the repeated game the expectation that further advance will be conceded, or at best will be defied, the image and the expectation of Russia's helplessness was consolidated. Only in 2014, with the occupation of the Crimea peninsula and the support of Eastern Ukrainian separatists Putin showed the first sign of his intention to revert the long downturn of Russia.

From a game theoretic point of view Putin now is trying to invert the situation. By starting the war against Ukraine, he signals to start a new game, a game in which Russia is the challenger and plans to lead a 'limited conflict' with the defender being the USA, a defender that shies away from all-out conflict.

²¹ See also (Zagare, 2018) for historical underpinnings for his game theoretic work.

If this interpretation holds, then Putin’s immediate strategic goal was not a new Russian imperium, but a stepwise enlargement of its sphere of influence. The unexpectedly heavy retaliation of the West with economic sanctions now has caught Putin’s inner circle in an impasse. The imitation of NATO strategy does not work because brutal direct coercive power – demonstrated by the weaker global power - cannot substitute for longer lasting strength with respect to civilian, democratic progress.

The **strategy to imitate the action of the opponent** - its last move - has been extensively studied in game theory; it has been called tit-for-tat strategy, e. g. compare (Axelrod and Hamilton, 1981), (Dixit and Skeath, 1999, pp.271-274). For simple repeated prisoners’ dilemma games of highly stylized agents with a limited memory of up to four rounds this strategy shows a surprising superiority. Nevertheless, the level of abstraction that these game theoretic studies have to assume forbids any too strong conclusion for actually observed warfare. But notice also that John Mearsheimer in his very influential book ‘The Tragedy of Great Power Politics’ (Mearsheimer 2003, 444 - 504) warns that China is challenging the USA by **imitating** the strategy that the US had applied when it did rise to hegemonic power just after WW2: namely to produce an environment of politically and militarily weak surrounding countries²².

This throws a light on how simplified game theoretic models should be used. Consider the elementary model of a 2-person prisoners’ dilemma in table 1. Assume that strategy 1 of country A is to increase its military expenditure next year by a percentage x, and that its strategy 2 is to keep its military expenditure constant. In an analogue way let country B choose between the same two strategies.

Table 1. Military Expenditure as a Prisoners’ Dilemma

| Prisoners’ Dilemma | | Country B | |
|--------------------|---------------|---------------------|---------------|
| | | Increase | Keep constant |
| Country A | Increase | <u>5</u> , <u>5</u> | <u>7</u> , 3 |
| | Keep constant | 3, <u>7</u> | 6, 6 |

The payoff matrix (first entry country A, second entry country B) describes an almost trivial situation: Of course, it would be better for both countries to use the tax payers’ money for socially more beneficial purposes (health, education) - a solution giving (point 7,7) - than for military expenditure (point 6,6). In particular this is the case if the current situation seems to be a stable and secure equilibrium of power. But in prisoners’ dilemma situation there nevertheless is the expectation of each country that a one-sided increase of military expenditure leads to an advantage that benefits the deviating country even more than (point 7,7) as long as the other country does not follow: (point 8,3) or point (3,8). Since both countries know pretty well about the strategies and expectations of the other country – even due to introspection – the only stable outcome is the Pareto inferior solution (point 6,6). There will be a continuous increase of military expenditure. In game theoretic jargon (point 5,5) is the only Nash equilibrium (both entries are underlined because they are best answers to the opponent’s choice):

The reformulation of such a simple, symmetric interaction between two equally powerful entities as a matrix of payoffs does not add any content. But in its rigorous clarity it opens up the space **to discuss its own limits in a similarly rigorous way**. E.g. to make explicit what is known about expectation formation, what is known about communication between agents, what happens if there are more agents? As Rapaport already had shown: There exists a 3-person prisoners’ dilemma, though it is substantially more difficult to formulate its conditions (Rapaport 1970). What is even more disturbing: 3-person game theory differs quite distinctly from 2-person game theory, both differing from 4-person game theory, and so on ... Only if the n of n-person game theory goes to infinity, only then things are getting easier again²³.

²² Mearsheimer’s views, in particular those concerning the Ukraine, are heavily criticized by another doyen of international relations’ studies: Richard Ned Lebow, see (Lebow, 2018).

²³ An interesting application of 3-person game prisoners’ dilemma situations to arms races has been provided by Frank Zagare (Zagare, 2021). He shows that their emergence hinges on rather demanding conditions.

Another simple archetype of a 2-person game is the already mentioned chicken game. Its payoff matrix differs only slightly from the prisoners' dilemma, but nevertheless it tells a different story.

Table 2. Bullying war heroes as a Chicken Game

| Chicken Game | | Country B | |
|--------------|------------------|------------|------------------|
| | | Be chicken | Stay on the road |
| Country A | Be chicken | 5, 5 | 3, 10 |
| | Stay on the road | 10, 3 | 0, 0 |

The original story has two drivers on a one-lane street heading with their cars at each other in high speed. Both face the decision either to leave the street, to swerve and being a coward ('chicken'), or to risk a deadly crash. Two dead heroes evidently are an outcome that both would see as very bad, (point 0, 0). On the other hand, if they both swerve, (point 5, 5), then each one in hindsight would regret that he was not bullying reaching a point with payoff 10. Note that the strategic situation differs from the prisoners' dilemma only by the fact that the lower right-hand payoffs now are smaller than all other payoffs. In this game there are two Nash equilibria and what will happen clearly depends on the assumptions concerning the expectation formation processes of the two opponents. The interesting opening question is what happens if this game becomes a repeated game? If both die, then there is no repetition. If both turned out to be cowards, then for each of them there is the temptation to assume that the other one will be chicken again next time. Note what happens if both strictly assume that the opponent acts as oneself (introspection). Then one will live together as two cowards forever - under the menace of dying simultaneously. But once a repeated game had started and one of the two Nash equilibria occurred, then it became manifest who is the bully and who is the chicken. In other words, reputation is being built and might be used for expectation formation in the next round. The chicken might remain chicken for several rounds. Remember the steps of the advance of NATO to the east? But with each experience of being chicken again a stock variable indicating emotional (or economic) frustration might be accumulating. And at some level a sudden behavioural break might occur: the all-time coward might stage a bullying attack. (Kilgour and Zagare 2007) is another variant of such a story. It is remarkable how a formalized retelling of an extremely simple story can illuminate what might have happened.

A further well-known twist of the story can be added. If one of the two drivers tears the steering wheel out and throws it out of the window, so that the other driver can see that, then this other driver suddenly has a clearly better option, namely, to swerve. This metaphor can be understood as the action to declare oneself **visibly as a madman** who will never stop to bully. Does Wladimir Putin style himself as such personage? If this action is believed, if it is considered to be correctly observed, a credible threat, then the opponent has no other choice than to become chicken.

A final point on the interpretation of game theoretic models is needed: The considered **agents** usually are only described by the actions they can take, most of their properties are left open to the interpreting application. Contrary to that the field of international relations often takes for granted that the agents considered are 'nation states'²⁴. In most of this literature the attribute of 'nation' is taken to be the most significant glue that keeps a group of human individuals together. Nationalism is seen to be the strongest motive for human movements. Opposed to that, in game theory a large part of theory building falls prey to the prejudices of neoclassical microeconomics, namely that the single, 'rational' human individual, the homo economicus, should be the role model after which agents in game theory should to be formed. Both approaches fall short of the superior opportunities that **classical political economy** offers: There is a rich description of class dynamics in each society. A ruling class, eventually a few ruling classes, are the main decision-makers concerning the behaviour of a state. The state itself achieves its own dynamic nature by its internal feedback loops that link economic and ideological processes to the governing top. In today's globalized production system national ruling classes usually

²⁴ Mearsheimer constructs his dynamics of 'Great Powers' on the background of a globally 'chaotic anarchy of nation states'. Hegemony then is always achieved by a nation state that manages to dominate all the others, mainly by military force.

are tightly interlocked. Instead of an anarchy of nationalisms there is a monolithic structure of global value chains that organizes exploitation. At the points where profits from this exploitation chains reach a certain local peak, at these points local ruling classes form a 'state'. Due to historically grown infrastructure (geography, language, etc.) such a state might consider itself to be a nation state. Only then, there is ideological feedback from the top level of governance to the citizens of the state (the false homo economicus), feedback in which personal welfare and national pride are mixed to produce nationalist movements. It is clear that this much more sophisticated approach of political economy calls for a much more sophisticated design of game theoretic models.

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MACROECONOMIC DYNAMICS AND THE ROLE OF MARKET POWER. THE CASE OF ITALY

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Abstract:

In recent years, the US and other advanced countries have experienced macroeconomic dynamics which raise some concerns and which, according to the literature, are at least partly attributable to a rise in product market power. This study mainly aims to understand how Italy performs in terms of five relevant economic variables (i.e., domestic investment rate, labour share, labour force participation, wage inequality and economic dynamism), and whether firms' markups are on the rise. The picture that emerges is mixed, and the negative performance in terms of business dynamism and wage dispersion may be ascribable to an increase in product market power. The firm-level analysis of the Italian manufacturing sector for the years 2011-2018, which complements previous empirical analysis on product market power in this country and accounts for labour market power as well, reveals an increment in the average markup which, however, is not particularly pronounced and unsettling, and which is preceded by a period of steady decline. Moreover, this trend is accompanied by a more remarkable increase in the workers' labour market power, which helps explain the modest growth in the revenue-based labour share observed during the same period.

Keywords: labour share; market power; markup; investment; inequality.

JEL Classification Codes: E25; J42; L11.

Introduction

In recent years, several studies have attempted to shed light on some macroeconomic trends experienced by the economies of the US and other advanced countries, which are somehow puzzling and raise some concerns. These include a decrease in investment over output, a decline in both labour share and capital share, coupled with a rise in the profit share, a decrease in labour force participation, a rise in wage inequality, a slowdown in business and labour dynamism. In turn, these dynamics have implications, for instance, for welfare and resource allocation, as well as potential ramifications for policy, such as antitrust, monetary policy and income redistribution (De Loecker, Eeckhoutz and Unger 2020).

From the analysis conducted by a recent strand of literature, it emerges that the increase in firms' product market power, which is typically measured by the price-cost margin, or markup²⁵, is one of the

²⁵Another variable which is often used as a proxy of product market power and which is also employed by some papers reviewed in Section 2 is market concentration. However, as IMF (2019) and Syverson (2019) point out, this measure should be interpreted with great caution, and can be misleading if used to assess the degree of product market power. Indeed, market concentration includes no information about costs or profits, and necessarily requires a definition of market, which is often a point of contention. More importantly, concentration is an outcome, rather than an immutable core determinant of how competitive an industry or market is, and it can be associated with either less or more competition. As for markups, the

leading factors driving these macroeconomic trends. In particular, De Loecker, Eeckhout and Unger (2020), who employ the methodology proposed by De Loecker and Warzynski (2020) to estimate firm-level, time-varying markups, document a significant increase in product market power across US non-financial corporations over the last few decades, and link it to some of the aforementioned phenomena. Since the working-paper version of De Loecker and co-authors' study was made public, economists have been debating the magnitude, relevance and implications of these findings: discussion has taken place both via the examination of countries other than the US (*e.g.*, Díez, Leigh and Tambunlertchai 2018; De Loecker and Eeckhout 2018; van Heuvelen, Bettendorf and Meijerink 2019; IMF, 2019), and through a comparison of the estimates obtained using different approaches and specifications (Basu 2019; Syverson 2019). As an illustration, the IMF (2019) shows that, between 2000 and 2015, most of the advanced countries experienced a moderate increase in corporate markups, and that the latter contributed to the contraction of private investment, labour share and R&D expenses that have affected several advanced countries since the beginning of the new millennium.

In this study, after reviewing the pertinent literature, we focus on Italy, an advanced country that has exhibited a mixed economic performance especially in the aftermath of the economic crisis. Specifically, we first document the evolution of five macroeconomic trends, using aggregate data, in order to understand if, how and to what extent this country differs in terms of such dynamics from the US or other economies. After that, we estimate two indicators of market power (capturing imperfections on the product market and the labour market, respectively) at the firm level, and we analytically and graphically show how they relate to a key labour market indicator which has been the object of intense scrutiny, namely the labour share of income. The analysis is not limited to markups but investigates the presence of labour market frictions as well. As Blanchard and Giavazzi (2003) posit in a seminal theoretical work, product and labour markets are indeed intimately related: the market power of the firm determines the size of the rents, and the bargaining between the firm and the workers determines the distribution of these rents. In recent years, a fast-growing strand of empirical literature has tackled both product market power and labour market power (*e.g.*, Dobbelaere and Mairesse, 2013; Soares, 2019; Mertens, 2019 and 2020; Caselli, Nesta and Schiavo, 2021), with the latter being held either by the firms' owner ("monopsony power") or by the firms' workers ("bargaining power").

Although Italy has been included in some cross-country studies on markups (*e.g.*, Calligaris, Criscuolo and Marcolin 2018; Díez, Fan and Villegas-Sánchez 2019), empirical research on this subject (especially microeconomic research) has been limited so far. Giordano and Zollino (2017) compute macroeconomic total-economy estimates of Italy's markups since 1861 and sectoral markups for the time span 1970-2012, using different methodologies. With regard to the most recent decades, they document a reduction in markups after the completion of the Single Market, which accelerated after the inception of the European Monetary Union. Evidence of a pro-competitive impact of the euro adoption is also provided by Bugamelli, Schivardi & Zizza (2008), while Bugamelli, Fabiani & Sette (2015) show that, in recent years, import competition (especially from China) has contributed significantly to curbing price dynamics and firms' markups. Thus, it seems that the trend in product market power observed in Italy between the beginning of the nineties and the first decade of the new millennium differs from the dynamics reported for the US in the same period. However, Bugamelli, Schivardi and Zizza (2008) and Bugamelli, Fabiani and Sette (2015) do not employ a direct measure of markups, and the work by Giordano and Zollino (2017) produces aggregate estimates. Moreover, none of them cover the most recent years. Our work thus advances our knowledge of market frictions in Italy. It also adds to the broader strand of literature on the recent evolution of firm-level markups and their implications (*e.g.*, De Loecker, Eeckhout & Unger 2020; Calligaris, Criscuolo & Marcolin 2019; Fan & Villegas-Sánchez 2019; van Heuvelen, Bettendorf & Meijerink 2019), and ties particularly well into the recent line of research that analyses firm-level market power in both the product market and the labour market.

literature has identified various methodologies aimed at estimating them at the industry level and, more recently, at the firm level (see Mondolo, 2020 for a review).

The balance of this work is organized as follows. Section 2 briefly reviews the literature on the effect of product market power on five macroeconomic variables. Section 3 illustrates the performance of the Italian economy in terms of the variables described in Section 2. Section 4 presents the microeconomic analysis of the Italian manufacturing sector. Section 5 concludes.

1. A Review of the Literature on Product Market Power and Macroeconomic Trends

In this section, we shortly review the literature that investigates the role played by product market power in affecting five macroeconomic variables, namely: (domestic) investment rate, labour share, labour force participation, wage (and wealth) inequality, and economic dynamism.

1.1 Domestic Investment Rate

Capital investment is often regarded as a key driver of firm-level and industry-level growth. Thus, the decline in the investment rate experienced by the US and other OECD countries from the early two-thousands raises some concerns, and the possible determinants of this trend have been the object of several empirical studies, some of which also account for product market power. Indeed, as De Loecker, Eeckhout and Unger (2020) argue, higher markups typically lead to lower demand for goods and then to lower output, which, in turn, prompts firms to reduce their demand for capital and, therefore, their investment.

Gutiérrez and Philippon (2017) use industry-level and firm-level data on private fixed investment in the US covering more than thirty years to show that the underinvestment relative to measures of profitability and valuation (particularly Tobin's Q) can be attributable to changes in the nature or localization of investment (due for instance to the rise of intangibles or globalization), tightened corporate governance, increased short-termism and also decreased competition. In particular, the authors show that industries with less competition (measured by higher indexes of market concentration, including the Lerner index) invest less. This result, which also holds after controlling for intangible intensity, firm age and Tobin's Q, has been incorporated in the quantitative model of the US economy built by Eggertsson, Robbins and Getz Wold (2018). The authors' framework, characterized by imperfect competition, barriers to entry, the trading of pure profits, and realistic asset pricing, aims to provide a unified explanation of a set of somehow puzzling macroeconomic trends observed in the US in the last three decades: the aforementioned contraction of the investment rate despite historically low borrowing costs and a high value of empirical Tobin's Q, an increase of the latter to a level permanently above one, the decline in both the factor shares, accompanied by a rise in the profit share, and an increase in the financial wealth-to-output ratio, despite low savings rates and a stagnating capital-to-income ratio. Eggertsson and co-authors hypothesize that the rise of market power is a key force behind these trends. Then, using their estimates of markups and real interest rates, they show that these stylized facts can be explained by an increase in market power and pure profits in the US economy (along with forces that have led to a persistent long-term decline in real interest rates).

Empirical evidence of the linkage between product market power and investment has been found in countries other than the US as well. As an illustration, the microeconomic analysis conducted by the IMF (2019) reveals that private fixed investment has declined by about 25%, on average, across advanced countries since the global financial crisis, compared with its pre-crisis trend, despite a large and persistent fall in borrowing costs, higher rates of corporate profit and higher expected returns on capital. Specifically, the average increase in markups since 2000 is associated with a 0.4 % decrease in the investment rate, while, when only firms in the top decile of the markup distribution are included in the sample, the average growth of markups leads to a 2 % reduction in the investment rate.

However, it is possible that the relationship between markups and investment is not linear. In particular, Diez, Leigh and Tambunlertchai (2018), who estimate the evolution of markups of publicly traded firms in seventy-four economies from 1980 to 2016, identify a U-shaped relation between investment and markups, according to which higher markups are initially associated with growing investment, but, at a certain level, increases in markups become associated with lower investment.

Other empirical analyses for a country other than the US have been recently carried out by Sun, Yuan and Wang (2021) and Armijos and Cuenca (2021). Sun, Yuan and Wang investigate the link between product market power and a peculiar form of investment, namely R&D investment, using an extensive sample of Chinese of manufacturing firms. The authors, who unify two measures of product market power often used in the literature, namely the firm-level Lerner index and the industry-level Herfindahl index, in a hierarchical linear model, find that firms are less likely to invest in R&D as their market power intensifies, and that this effect is nonlinear, namely, firms with higher markups spend even less on R&D than a linear specification predicts. Armijos and Cuenca combine firm-level indicators (including investment and ROA, which are used as the dependent variable in two separate regressions) with industry-level variables (including their proxy of product market power, namely the Herfindahl-Hirschman index) to evaluate the socially optimal levels of investment of Ecuadorian firms and their relationship with product market power, and conclude that the level of market concentration has a positive relationship with profitability and a negative one with corporate investment.

Concerning Italy, the macroeconomic study by Forni, Gerali and Pisani (2010) proposes a dynamic general equilibrium model allowing for monopolistic competition in the labour, manufacturing and service markets. This model simulates the macroeconomic and spillover effects of an increase in the degree of competition in the Italian service sector, which, according to the authors, is characterized by relatively high corporate markups. The results indicate that a reduction of services markups to the levels of the rest of the euro area would have a positive effect on the levels of private investment, production and employment, and would be associated with an 11 % increase in the long-run Italian GDP.

1.2 Labour Share

A key labour market indicator which is often under scrutiny is the labour share of income. In particular, in recent years, several researchers have attempted to shed more light on what is often defined as “the secular decline” in the US labour share, which contrasts with the historical stylized fact of stable labour share highlighted by Kaldor (1957). Many possible explanations have been put forward, such as the decrease in the relative price of investment goods due to information technology (*e.g.*, Karabarbounis and Neiman 2014), the introduction of labour-market institutional reforms leading to a reduction in the bargaining power of labour (*e.g.* Bental and Demougin 2010), the change in the industry composition to the detriment of manufacturing (*e.g.* Armenter 2015), the rapid expansion of trade and international outsourcing (*e.g.* Elsby, Hobyn and Sahin 2013), and the increasing importance of intangible capital, associated with lower expenditures on labour (*e.g.* Koh, Santaeuàlia-Llopis and Zheng 2020). However, an emerging strand of literature underlines the fact that these hypotheses are supported by mixed empirical evidence, and more importantly, that they assume there is a trade-off between labour and capital (namely, that firms have replaced expenditures on labour inputs with expenditures on capital inputs), which does not always occur. Moreover, it shows that the rise in the US corporate markups has played a prominent role in this decrease in the labour share.

Barkai (2020), who develops a calibrated model which considers both labour share and capital share²⁶, empirically demonstrates that a decline in competition plays a significant role in the decline in the labour share. He also illustrates that an increase in markups is necessary to match the simultaneous

²⁶ The capital share of income is typically defined as the ratio between a firm’s capital compensation, or capital cost, and its value added. Although this expression is quite simple and intuitive, there is not unanimous consensus on the way this indicator should be computed. The first approach, which is often referred to as the ex-post approach, assumes that all dollars not paid to labour are capital costs. Then, the capital share is simply the residual of the labour share, and profits are zero. However, there is another approach, pioneered by Hall and Jorgenson (1967), which allows them to estimate the capital share directly. This method specifies an ex-ante required rate of return on capital, derived from the standard model of production theory, which, when multiplied by capital stock, makes it possible to compute capital compensation (the numerator of the capital share), and thus, the capital share. When estimated this way, the capital share can decline also when the labour share decreases (see, for instance: Barkai 2020; De Loecker, Eeckhout and Unger 2020; Karabarbounis and Neiman 2014; Rognlie 2015; Eggertsson, Robbins and Getz Wold 2018).

decline in the shares of labour and capital. Autor *et al.* (2020) hypothesize that, due for instance to technological or institutional changes, those companies with superior quality, lower costs, or greater innovation have started to reap growing rewards. Since these firms, which are defined as “superstar firms”, have higher profit levels, they also tend to have a lower share of labour in sales and value added. Thus, as they gain market share across a wide range of sectors, the aggregate labour share falls. The predictions of this model are supported by the authors’ empirical analysis based on US firm-level data referring to the period 1982-2012.

Also, De Loecker, Eeckhout and Unger (2020) argue that a negative relationship between the expenditure on inputs, including labour, and the markup is directly implied by the expression for a firm’s markup (the latter being identified as the ratio of an input’s output elasticity and its revenue share) derived by De Loecker and Warzynski (2012) using standard first-order conditions on a firm’s cost minimization. The authors corroborate this statement through a simple regression analysis.

Moreover, Dixon and Lim (2020) theoretically and empirically show, by means of a VAR approach, that the decline in the labour share that occurred between 2001 and 2013 in the US is ascribable to both changes in production technologies and a rise in corporate market power (be it on the product market and/or labour market side). Similar results are obtained by Cairo and Sim (2020), who develop a real business cycle model and show that the rise in market power of the firms in both product and labour markets over the last four decades can generate a decline in the labour share, as well as other secular trends such as rising profit share and rising income and wealth inequalities.

Gutiérrez (2018), who investigates the trends in labour and profit share across 12 advanced economies during the period 1980-2009, remarks that the well-documented labour share dynamics observed in the US since the beginning of the new millennium differ from those experienced by other advanced countries, most of which have exhibited a quite stable trend in (non-housing) labour share. In this regard, some studies focusing on the OECD countries and Europe indicate that also there, labour share on average has recently fallen, but not as remarkably as in the US, and, importantly, with relevant differences across countries²⁷. Nonetheless, a negative link between labour share and product market power is generally detected also by the literature that considers non-US countries. Within this line of research, several studies have estimated firm-level markups using methodologies that imply the estimation of a production function.

As an illustration, the IMF (2019) shows that the (firm-revenue-weighted) average markup based on a sample of 27 countries increased by 6 % during the period 2000-2015, and that this rise has contributed to the recent contraction of firms’ labour shares. In particular, for the overall sample, the average increase in markups since 2000 is associated with a 0.2 % decrease in the labour share, whereas for the sample of top decile firms, the average increase in markups is associated with a 1 % decrease in the labour share, a result which reinforces the “superstar firms” hypothesis. Similarly, the cross-country, firm-level study by Diez, Leigh and Tambunlertchai (2018) on the relationship between markup and investment, innovation, and labour share respectively (see also section 2.1) finds that the association between the markup and the labour share is generally negative.

²⁷ Schwellnus, Kappeler and Pionnier (OECD, 2017) report that the average OECD labour share has declined over the past two decades, but that in a number of OECD countries, including France, Italy and the United Kingdom, labour shares have remained broadly constant or have increased. Relatedly, a recent McKinsey’s discussion paper by Manyika *et al.* (McKinsey Global Institute, 2019), which reviews the literature on the determinants of the labour share, including market power, recognizes that declines in this variable across advanced economies have been widespread, but not uniform. According to this study, the adjusted labour share of income (based on the product between the ratio of total compensation of employees to GDP and the ratio of total employment to the number of employees, in order to account for self-employed households too) decreased by 4.5 % in Spain and by 2.5 % in Germany between 2000 and 2017, but, during the same period, rose by 2.2 % in France and by 1.7 % in the United Kingdom. In another OECD Working Paper, Schwellnus *et al.* (OECD, 2018) shed more light on the determinants of the changes in the labour share that occurred between 1995 and 2011 in 20 OECD countries (including Italy). The authors assert that countries with falling labour shares have witnessed both a decline at the technological frontier, which mainly reflects the entry of firms with low labour shares, and a reallocation of market shares toward “superstar” firms with low labour shares.

A comprehensive analysis of the determinants of variations in the labour share which includes both firms' markups and labour market power has been recently conducted by Mertens (2019). The author develops a parsimonious micro-founded production side theory offering three competing explanations for the fall in the labour share: an increase in firms' product market power, an increase in labour market power owned by the firm (employer), also known as monopsony power, or a fall in firms' output elasticity of labour, which reflects the decreasing importance of labour in firms' production activities. The author stresses that, in contrast with what common production models assume, the output elasticities of factors can change over time. He also argues that the assumption of competitive labour markets, employed for instance by Barkai (2020), Autor *et al.* (2020) and De Loecker, Eeckhout and Unger (2020), makes it unclear whether the documented rise in market power reflects a rise in firms' product or labour market power. Accordingly, he extends De Loecker and Warzynski's (2012) framework to incorporate frictions in the labour market, which can be easily recovered after computing the input cost shares and estimating the parameters of the production function used to derive the markups. When he applies his framework to microdata on German manufacturing firms, he finds that 70% of the labour share decline that occurred between 1995 and 2014 in the German manufacturing sector is explained by a decrease in the output elasticity of labour, while the remaining 30% is attributable to firms' increasing labour and product market power, and then to market distortions. These results suggest that it is important to account for both product and labour market power (which also have different policy implications), and that the common assumption of constant output elasticities of inputs may be rejected by the data.

Another microeconomic study that derives corporate markups from the estimation of a firm-level production function has been recently conducted by Yilmaz and Kaplan (2021). Using a large sample of Turkish manufacturing firms, they identify a negative relationship between the labour share of firms and their markups and observe that large firms with high markups spend less on labour.

A different approach, which assesses the impact of the effectiveness of the competition policy in place, which in turn affects product market power, is adopted by Zac *et al.* (2021). The authors, who resort to a panel of 22 industries in 12 OECD economies over the period 1995-2005 and the Competition Policy Index (CPI) compiled by Buccirossi *et al.* (2013) as a measure of the quality of competition policy, find a positive link between the former and the labour share trend and show that the main mechanism through which competition policy affects the labour share is through its ability to constrain markups. In particular, the results suggest that the implementation of an effective competition policy could be particularly important in mitigating the decline of the labour share in settings characterized by low levels of labour protection and labour bargaining power.

Regarding Italy, Torrini (2016), who explores the long-run trends and recent patterns in labour, profit and housing rent shares in this country, suggests that the slowdown in the Italian labour share observed between 1975 and 2001 was due in part to the recovery in profits, and in part to a steady increase in housing rents on GDP. He also hypothesizes that the trend reversal in this variable, which started well before the onset of the crises, is mainly attributable to a compression in corporate markups, and to the difficulty experienced by the Italian firms in being rewarded for their innovation in a more competitive environment. Torrini also highlights that, when discussing factor shares, it is necessary to specify the definition of value added used, the way self-employment labour income is dealt with, and the role played by the incidence of the public administration and the housing sectors. For instance, the inclusion or exclusion of housing rents in the computation of the value-added may cause differences in the estimation of labour share. Micro econometric evidence of a negative relationship between product market power and the labour share in Italy has been provided by Dall'Aglio *et al.* (2015) and Perugini *et al.* (2017), who estimate the labour share at the firm level for a large sample of Italian companies (and also for companies from other five EU countries in Perugini *et al.* 2017) and investigate its main determinants. Both these studies find a significant and negative coefficient for product market power, which, however, is not estimated using a production function, but is simply proxied by the return on sales and the ratio between sales minus variable costs and sales, respectively.

Accordingly, despite a certain heterogeneity in terms of variations in the labour share within the group of OECD countries, it seems that changes in corporate market power may play a role in this regard not only in the US. However, as Torrini (2016) recommends, it is important to keep in mind that the computation of the labour share indicator may affect the results. First, the labour share of employees is easier to estimate than that of self-employed individuals because there are no direct measures of these workers' wage. Elsby, Hoxby and Sahin (2013) focus on self-employment in the US and conclude that a third of the decline in the headline measure of labour share is an artefact of statistical procedures used to impute the labour income of the self-employed. Secondly, labour share trends may be affected by the inclusion of income from the real estate sector. In this regard, Gutiérrez (2018) and Gutiérrez and Piton (2020) show that the non-housing gross labour share remained stable in Europe and declined only in the US. In addition, according to Cetto, Koehl and Philippon (2019), since the labour share in many European countries was above its steady-state value in the late seventies, and it was bound to revert to its long-run average, empirical studies that take the period 1973-1983 as a starting point are likely to find a spurious decrease in this variable. Cetto, Koehl and Philippon do not find a general decline in the labour share in their sample of advanced economies after correcting for these three potential biases (namely, accounting for residential real estate income, self-employment, and start and end periods for the empirical analysis). This holds even for the US: this economy actually experienced a sharp decrease in the labour share between 2000 and 2015, which, however, cannot be regarded as a "secular decline" according to the authors. Therefore, when interpreting the results of an empirical analysis on the labour share, and when comparing them with those produced by other studies, it is important to pay attention to the way this variable has been computed.

1.3 Labour Force Participation

As De Loecker, Eeckhout and Unger (2020) suggest, a rise in product market power and the corresponding increase in prices of goods sold implies a decrease in the aggregate output produced. The latter typically leads to lower demand for labour, which in turn should result in lower labour force participation and lower wages. Thus, an increase in corporate markups may also negatively affect the activity rates. The authors also report that labour force participation of both males and females has actually declined in the US in the last few decades.

Although the literature has identified a range of possible drivers of the trends in the activity rates in the US or other countries (see Mondolo, 2020 for a review), the effect of product market power on labour force participation has been under-researched so far. As far as Italy is concerned, De Philippis (2017) argues that the increase in Italy's participation rate between 2004 and 2016 is mostly related to the rise in the population's share of highly educated individuals (who are more strongly attached to the labour market), and to the positive labour supply effects of the recent pension reforms. It may be worth investigating whether the documented increase in competition and deregulation that occurred in the Italian economy between the beginning of the nineties and the beginning of the new millennium has contributed to some extent to the steady increase in the Italian activity rate.

1.4 Wage Inequality

Wage (or income) inequality, which, since the seventies, has increased substantially not only in the United States, but also in the UK and many other countries (see Atkinson and Piketty 2009), has been the subject of extensive investigation. A comprehensive review of recent contributions on this topic has been performed by Nolan, Richiardi and Valenzuela (2019), who identify the following main drivers of wage inequality: globalization; technological change; finance, monetary policies, macroeconomic cycles and shocks; labour market institutions and labour market power; product market power; redistribution of market income by the state via taxation and social expenditure. The authors also argue that it is difficult to properly disentangle the impact of specific factors, that the possible interactions between them have been neglected so far, and that the importance of institutions and policies is likely to be under-estimated. Moreover, they posit that more evidence on the evolution of market power in both

product and labour markets and on the role market power plays in recent inequality trends is a “particular priority”.

As Han and Pyun (2021) explain, since extra profits are distributed in proportion to current firm ownership claims, higher markups hurt consumers, who pay higher prices, but benefit those individuals, such as business owners, corporate managers, and executives, with firm ownership claims. As these individuals are concentrated at the top of the income distribution, market power and corporate rent-seeking lead to a redistribution of income from consumers to firm owners. In the long run, this accumulated redistribution from consumers to firm owners helps top-income groups accrue more firm ownership claims, thereby raising their income even more disproportionately. As a result, the lack of competition is associated with rising income inequality.

Even though they do not delve into this topic, some previously mentioned studies hint at a potential causal link between product market power and inequality. For instance, Eggertsson, Robbins and Getz Wold (2018) assert that, when markups are higher, workers are given a lower share of output, while capitalists get a larger share. Since, generally, individuals with higher incomes receive a consistent percentage of their earnings as capital income, whereas the poorest individuals do not hold financial assets, this mechanism will tend to increase income inequality. De Loecker, Eeckhout and Unger (2020) notice that the secular decline in US wages mainly concerns low-skill wages, suggesting that the increase in markups has mainly affected the compensation of low-skill workers. Autor *et al.* (2020) contend that linking the rise of superstar firms and the fall of the labour share with the trends in inequality between employees should be an important avenue of future research. Zac *et al.* (2021) argue that an effective competition policy may be an important contributor to lowering levels of economic inequality (*i.e.*, income and/or wealth inequality) in the long run via changes in the labour share.

An early attempt to explore the distributional effects of product market power was made by Comanor and Smiley (1975), who formulate and estimate a model of monopoly and wealth inequality and argue that the lack of competition leaves 93% of the population worse off. The main quantitative approach introduced and applied by Comanor and Smiley has been more recently extended and updated by Ennis and Kim (2016), who calibrate the impact of wealth distribution for eight OECD countries. The authors show that the disproportionate effect of product market power on the poor and the wealthy, despite some inter-country heterogeneity, is substantial across all the economies examined, and that the lack of competition increases the wealth share of the top 10% of households by 10-24%. Ennis, Gonzaga and Pike (2019) model the potential impacts of product market power on wealth distributions for the sample selected by Ennis and Kim employing a new approach that addresses the model limitations in prior work and makes a comparative static analysis between two different scenarios (one with existing levels of market power and another with competition enhanced). In addition to a similar effect on the share of wealth, Ennis, Gonzaga and Pike find that a lack of competition reduces the income of the poorest 20 % by a percentage ranging between 14% and 19%.

Gans *et al.* (2019) look at the role played by product market power in wealth inequality focusing on corporate equity. They recall that economic theory suggests that monopoly prices hurt consumers and benefit shareholders, and that in a world where individuals or households can be both consumers and shareholders, the impact of market power on inequality depends in part on the relative distribution of consumption and corporate equity ownership across individuals or households. Then, they report that, in 2016, the top 20 % consumed approximately as much as the bottom 60 % but had 15 times as much corporate equity and, because ownership is more skewed than consumption, increased markups increase inequality. Also, Khan and Vaheesan (2017) argue that the failure of antitrust to preserve competitive markets contributes to regressive wealth and income distribution.

Although there are a considerable number of studies on this topic, quantitative evidence on the link between income inequality and direct measures of product market power is still limited. Drawing upon Han (2014), Han and Pyun (2021) assess the relationship between income dispersion and an increase in markups (measured at the country level by applying De Loecker and Warzynski’s definition

as the ratio between the output elasticity of labour and the labour share) in 20 countries during the years 1975-2011, and find that a rise in markups is positively associated with rising income inequality. Their study, which accounts for the role of labour market policies, also reveals that the positive relationship between markups and income inequality is less pronounced in countries with better labour protection, such as the statutory protection and power of labour unions, generous unemployment benefits, and mandatory minimum wages.

Finally, according to Bakir, Hays and Knoedler (2021), who briefly recall the history of American antitrust and analyse the data on rising profit shares and market concentration and declining labour share in the US manufacturing sector, the laissez-faire bent of the Chicago School of Antitrust toward corporate bigness should be recognized as another strong contributor to rising income inequality in the country.

1.5 Economic Dynamism

Following ECB (2019), the term “economic dynamism” used in this work encompasses business dynamism and labour-market dynamism. The former typically refers to the rates of firm entry and firm exit, while the latter concerns job flows and can include labour reallocation, job-to-job transitions, non-employment to employment transitions and employment to non-employment transitions, and/or job creation and job destruction. Market economies are characterized by a continuous reallocation of resources (capital and labour) across firms and sectors. This reallocation raises aggregate productivity directly, as resources move from less to more productive firms (and less efficient firms are replaced by productive, and often young firms), but also indirectly, since the increased availability of resources allows these firms to expand further. However, such economic dynamism can be hindered by incumbent firms with high market power, which may be used to deter entry through the threat of a price war or privileged access to partner firms, or lobby for the establishment of occupational licenses.

In this respect, De Loecker, Eeckhout and Unger (2020) posit that, in an environment characterized by corporate market power, when productivity shocks occur, firms adjust their variable inputs to a lesser degree than they would in a competitive market. This is consistent with Decker et al.'s (2014) finding that, in the US economy, it is not the volatility of productivity shocks, but rather the responsiveness of firms' output and labour force decisions to the existing shocks that has declined over the last three decades. Thus, De Loecker and co-authors suggest that the rise in market power can rationalize the decrease in labour reallocation across firms even if the observed shocks to firm productivity have remained constant.

Drawing on OECD data, Furman (2018) suggests that the reduced fluidity and dynamism of the economy is partly a “natural” reflection of trends like the increased importance of network externalities and partly a “manmade” reflection of policy choices, like increased regulatory barriers to entry, which have favoured the rise of market power.

The ECB (2019) regards economic dynamism as an expression of product market power, and documents its evolution together with the dynamics of what it considers to be two additional indicators of product market power, namely market concentration and the markup, at the sectoral and the firm levels, across a group of four relevant economies of the euro zone (*i.e.*, Italy, Germany, France and Spain) during the years 2006-2015, drawing comparisons with the US. According to this study, in contrast to the situation in the US, the aggregate markup of the portion of the euro area under scrutiny has been fairly stable and has gone through a marginal decline since the late nineties/early two-thousands which is driven largely by developments in the manufacturing sector, and potentially by the impact of trade and monetary integration in the euro area. However, it should be noticed that, in this report, the markup is simply calculated as the ratio between output and input (labour and materials) costs. Concerning economic dynamism, while labour market dynamism in the US declined over the last two decades, in the euro zone it has not shown a clear trend. ECB also documents the decline in business dynamism in

the US between 1980 and 2015 and argues that it is not easy to replicate such analysis for the euro area and then make comparisons for various reasons²⁸.

To sum up, several studies suggest that increasing product market power has contributed to the decline in economic dynamism observed in several countries, but robust empirical analysis is still limited. Concerning Italy, few studies specifically address dynamism in the Italian labour market. As an illustration, Cefis and Gabriele (2009) analyse job flows in Trentino from 1991 to 2001 using firm-level data from INPS provided by the local Institute of National Statistics (Istat) bureau. The authors do not directly investigate the effect of changes in product market power. However, they reckon that the positive relationship between the GDP growth rate of the local economy and the rate of job creation-job destruction confirms the role played by macroeconomic conditions in generating job flows and implies that higher competition leads to higher job creation for “winning” firms and higher job destruction for “loser” firms.

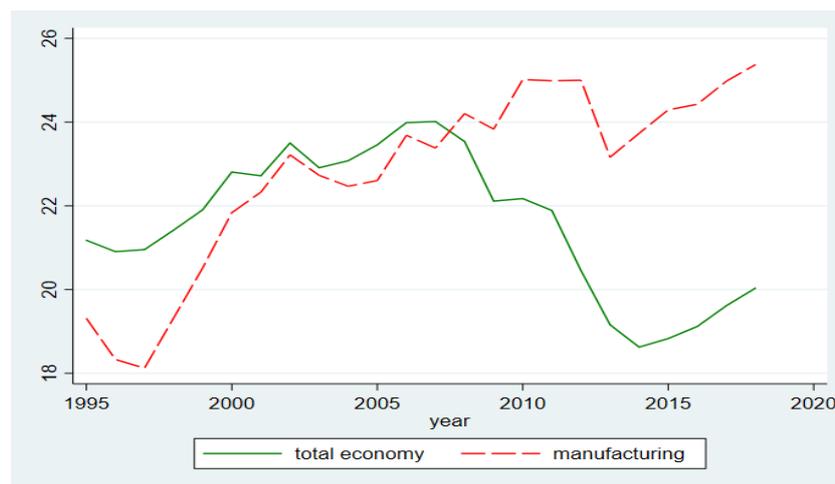
2. Macroeconomic Trends in Italy Based on Aggregate Data

In this section, using aggregate data compiled by Istat and, to a lesser extent, by some international organizations, such as Eurostat, ILO (International Labour Organization) and OECD, we show how the variables illustrated in Section 2, namely investment rate, the labour share of income, labour force participation, wage dispersion and economic dynamism, changed in Italy during the period 1995-2018 (or a shorter one, in case of limited data availability). We also make some comparisons with the US and/or the European Union as a whole to assess whether, how and to what extent Italy differs from other countries in terms of the macro-trends under scrutiny.

2.1 Investment Trends in Italy

Data on aggregate investment trends in Italy can be recovered from the “National Accounts” section of Istat Statistics, which reports annual data on gross fixed capital formation (“investimenti fissi lordi”). A limitation of this indicator lies in the impossibility of breaking it down into its private and domestic components and of disentangling tangible and intangible assets. Thus, the picture that emerges from the analysis of investment based on gross capital formation may partially change if private investment only were investigated.

Figure 1. Domestic investment rate in Italy (%), total economy and manufacturing, 1995-2018



Source: Istat

²⁸ Some of the reasons reported by ECB are: the EU data suffer from severe asymmetries in coverage (especially before 2006); business demography is quoted in terms of establishments (defined as the physical location a business operates in, and which can be more than one in the same firm) in the US, and in terms of firms in the EU; the definition of births and death can vary across different countries: in the US, the focus is on employer establishments, namely units of firms with at least one employee, while in the euro area, the unit of measurement is the firm (which corresponds to at least one establishment), irrespective of whether it has employees or not.

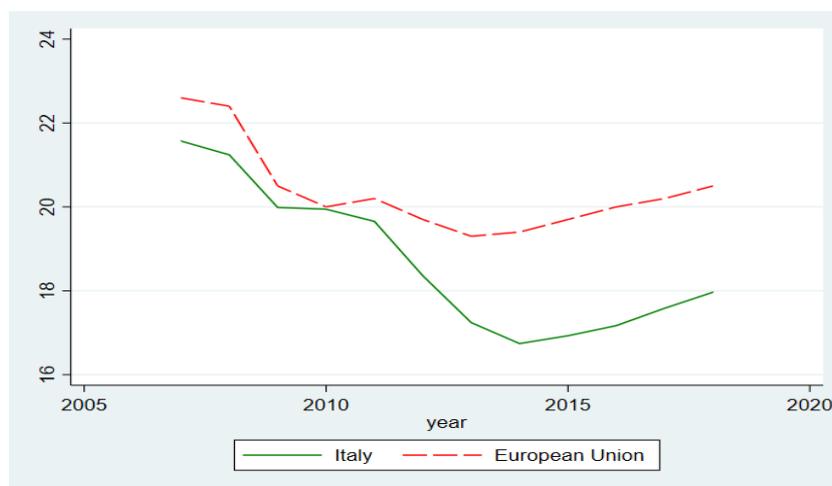
Figure 1 plots the Italian domestic investment for the total economy as a percentage of national gross value added, as well as the investment attributable to the manufacturing sector only (as a percentage of gross value added from manufacturing): total investment over output peaked in 2007, and then rapidly decreased until 2014, the year in which investment reached its lowest value of the 1995-2018 time-period. In recent years, total investment has shown a positive trend, growing at a rate which is similar to that of investment in the manufacturing sector. The latter has been characterized by a more stable, positive average investment trend and, since 2008, despite a contraction between 2008 and 2009, and later from 2012 to 2013, it has been outperforming the economy as a whole in terms of investment.

The dynamics of the two indicators diverge especially after the economic recession, and do not noticeably change when the investment rate is replaced by absolute investment.

Figure 2 offers a comparison between the domestic investment rate (gross fixed capital formation over GDP) in Italy and the investment rate attributable to the whole European Union for the period 2007-2018. Investment over output in the EU fell from 22.6 % to 20.5 % between 2007 and 2009, and further declined from 2011 to 2013. Except in 2010, when investment over GDP amounted to about 20% in both Italy and the European Union on average, the EU investment has been higher than the Italian one also in the aftermath of the economic recession. In the last few years, the two series have followed a similar path, but the gap between the two is still significant: while in 2010 it amounted to about 0.06 %, in 2015 it was equal to 2.83 %.

The gradual recovery of European investment may have been partly fostered by the “Investment Plan for Europe” proposed in November 2014 by the European Commission, which was supposed to mobilize at least 315 billion euro in private and public investment.

Figure 2. Domestic investment rate in Italy and in the European Union (%), 2007-2018



Source: Eurostat

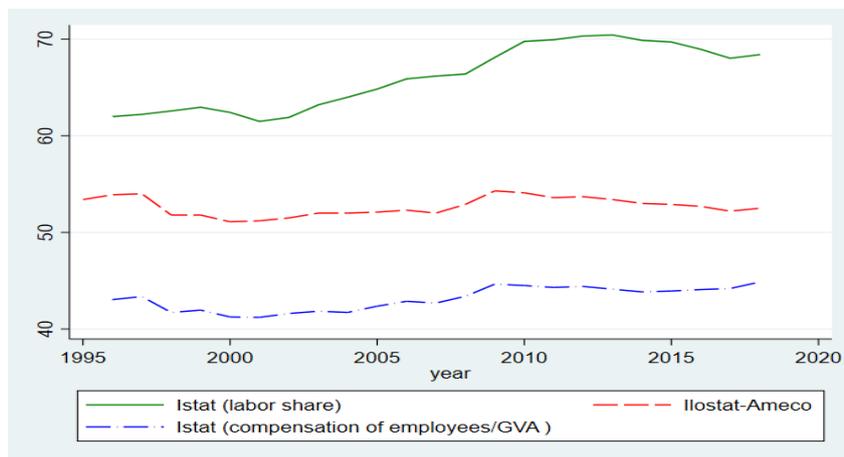
2.2 Trends in Labour Share in Italy

Data on the Italian aggregate labour share can be derived from both Istat Statistics and Ilostat. The labour share series based on these two data sources and referring to the years 1995-2018 are plotted in **Figure 3**. Looking at this figure, it can be noticed that the two indicators differ not only in terms of the absolute level (in particular, the labour share construct based on Istat data systematically and remarkably outperforms the one based on Ilostat data) but, more importantly, also in terms of trend. In particular, Ilostat-based labour share decreased slightly from 2009 to 2017, while Istat-based labour share peaked in 2013 and then also declined slightly from 2013 to 2017. Anyway, the latter shows an average positive trend over the selected period, while the Ilostat indicator does not display a clear prevailing direction. The main source of such a divergence seems to lie in the way the two indexes are computed (an issue which has been dealt with by a number of researchers and briefly illustrated in

section 2.2). Istat defines the labour share as labour compensation over value added at current prices. Labour compensation is measured as the sum of compensation of employees (which includes both wages and salaries and employers' social contributions), an estimate of the compensation of self-employed workers based on the attribution of the same average hourly compensation to self-employed workers as to employees (which is debatable), and a share of net taxes on production (which are allocated proportionately to labour and capital according to their shares in value added). ILO, which for the EU uses labour share data (available from 1960) stored in Ameco (*i.e.*, the annual macro-economic database of the European Commission's Directorate General for Economic and Financial Affairs), measures the labour share as total compensation of employees over GDP, both provided in nominal terms. Total compensation refers to the total remuneration, in cash or kind, payable by an enterprise to an employee in return for the work done by the latter during the accounting period. Thus, it seems that the numerator of the Istat labour share includes more elements than the Ilostat-Ameco one. Moreover, the former uses gross value added at the denominator, while the latter uses GDP.

Interestingly, the trend in the labour share indicator calculated as the ratio between compensation of employees and gross value added, whose data come from Istat as well and which is plotted in Figure 5, is very similar to the trend in the Ameco labour share, apart from a few years towards the end of the sample.

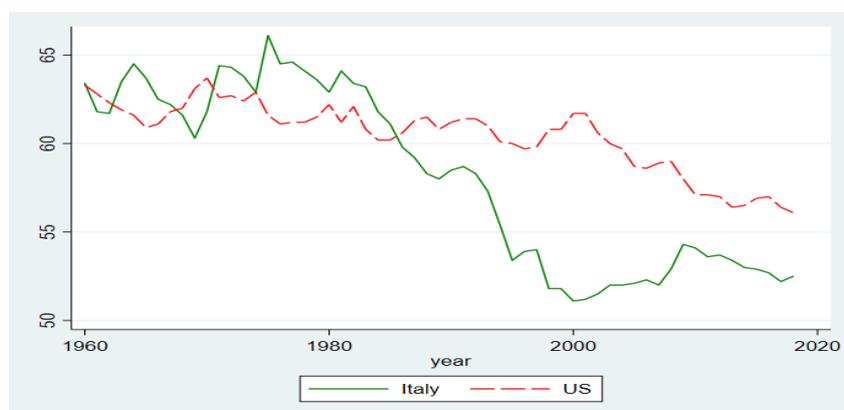
Figure 3. Italian labour share series based on different data (%), 1995-2018



Sources: Istat and Ilostat-Ameco

Labour share data compiled by Ilostat, which is a cross-country dataset, can be used to draw some comparisons between Italy and other economies. **Figure 4** plots the labour share of both Italy and the US for a considerable time horizon, from 1960 to 2018.

Figure 4. Labour share in Italy and the US (%), 1960-2018

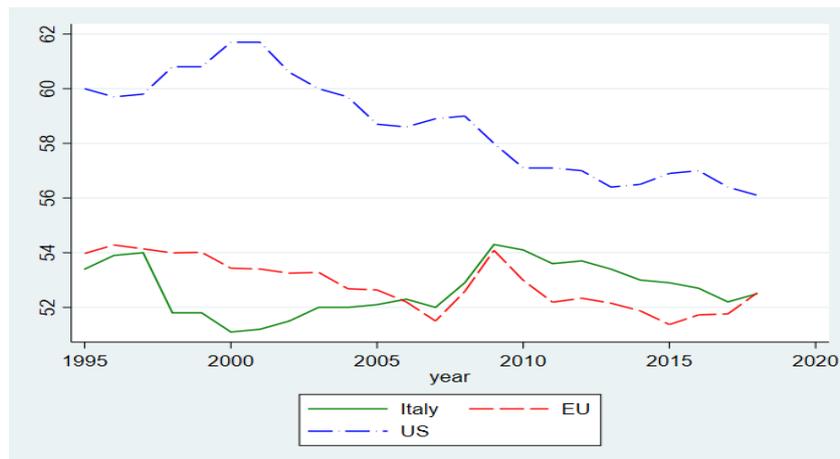


Source: Ilostat-Ameco

Figure 4 shows a steady average decline in the US labour share over time, and a sharp drop in the Italian labour share, which peaked in 1975 (amounting to 66.1%) and scored its lowest value (51.1%) in 2000. From 1986 onwards, the level of the Italian labour share has been systematically lower than the level of the US one. More specifically, the two series overlap in 1974, whereas in 2000 they exhibit the largest gap of the selected period. Since the beginning of the new millennium, the US labour share has been going through a well-documented phase of decline, while the Italian labour share shows a mixed trend.

After considering the US, we assess whether Italy differs noticeably from the rest of Europe in terms of labour share trend. To this purpose, in **Figure 5** we plot the average labour share in Italy, in the European Union (and in the US, too) for the period 1995-2018.

Figure 5. Labour share in Italy and the EU (%), 1995-2018



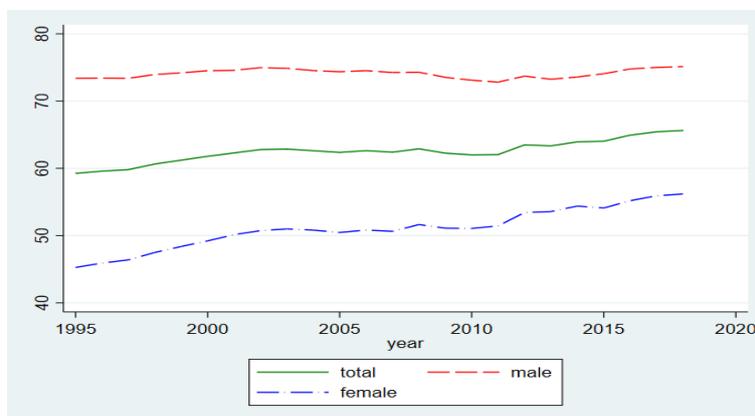
Source: Ilostat-Ameco

It can be observed that, in the European Union, the average labour share gradually declined from 1995 to 2007, and then experienced an increase of about 2.6 percentage points between 2007 and 2009, which is likely to be ascribable to its typically countercyclical behaviour. The labour share further decreased from 2009 to 2015, and then started growing again. Thus, the Italian performance diverged from the European experience in the period 1995-2005, and since then it has become more similar to the rest of the EU. Moreover, despite its negative trend since 2000, the US labour share has been systematically higher than both the Italian and the EU labour shares.

2.4 Trends in Labour Force Participation in Italy

The recent dynamics of the Italian labour force participation are captured by **Figure 6**.

Figure 6. Labour force participation rate (total, male and female) in Italy (%), 1995-2018

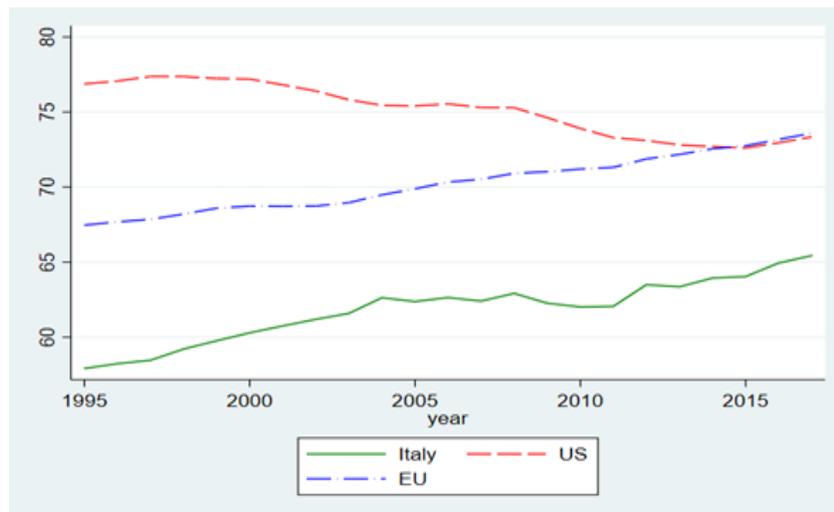


Source: Istat

The activity rate (age 15-64) increased from about 59.3 % in 1995 to about 65.6 % in 2018; as expected, female labour force participation was always noticeably lower than male force participation²⁹; however, the gap between the two fell over time, from about 28.14 % in 1995 to about 18.94 % in 2018. Moreover, the male activity rate slightly decreased between 2009 and 2011 (from 73.54 % to 72.83 %), and then recovered in recent years.

Figure 7 compares the Italian participation rate with the participation rate of the European Union and the US. While, as discussed in Section 2.4, the activity rate in the US declined (from 76.9 % in 1995 to 72.6 % in 2015), the activity rate in the EU increased steadily over time, and in the last few years available it is very similar to the US one. Conversely, it is higher than the Italian activity rate during the whole period.

Figure 7. Labour force participation rate in Italy, the EU and the US (%), 1995-2017

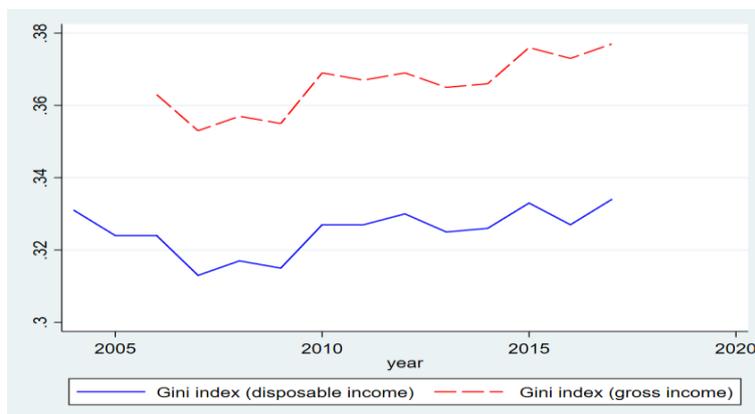


Source: OECD

2.5 Trends in Wage Dispersion in Italy

A widely used indicator of wage dispersion, and whose interpretation is very intuitive, is the Gini coefficient. Annual data on this indicator for the OECD countries since the early two-thousands (with several missing values for some countries) are available in the OECD Income Distribution Database (IDD) and are also reported in the OECD Stat database.

Figure 8. Gini Coefficient in Italy, 2004-2017



Source: OECD

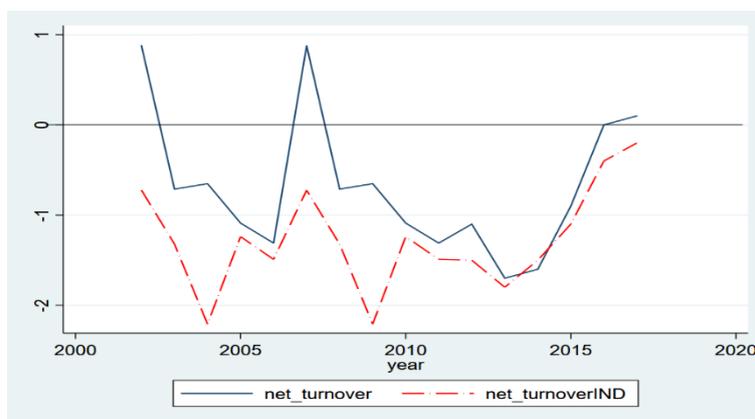
²⁹ The values for total labour participation rate (15-64) reported by Istat are slightly higher (by an amount varying between 1.3% and 1.5%) than the ones reported by OECD for the years 1995-2003 although both the organizations collected these data from the Labour Force Survey. It is possible that Istat has revised upwards the estimates for the years 1995-2003.

Figure 8 shows the Gini coefficient based on the gross income (before taxes) of Italian workers and the Gini coefficient based on disposable income (after taxes and transfers)³⁰. Focusing on the latter, for which data since 2004 are available, we observe that wage dispersion declined between 2004 and 2007, and then rose. In the 10 years between 2007 and 2017 the Gini index increased by 0.017 points. If we compare the Italian data with those referring to other countries, we can see, for instance, that in 2017 the level of the Gini coefficient in Italy was very similar to the level of this index found in Spain (0.334 and 0.333, respectively), and was higher than the one measured in other Western-European countries, such as France (0.292), Germany (0.289) and Sweden (0.282); however, the Gini coefficient suggests that wage dispersion in Italy in the whole period 2004-2017 is less pronounced than in the UK, which, in 2017, exhibits a Gini index equal to 0.357 (for more information and further comparisons, see the OECD Income Distribution Database).

2.6 Trends in Business Dynamism in Italy

As the indicators of labour dynamism mentioned in section 2.5 require the use of individual-level data to which we do not have access, in this section we only look at business dynamism in Italy. Istat publishes on its website a section labelled “business demography” which reports data on the birth rate (*i.e.*, the number of enterprise births in the reference period divided by the number of enterprises active in that period, in percentage terms), the death rate (*i.e.*, the number of enterprise deaths in the reference period divided by the number of enterprises active in that period), the business churn (*i.e.*, the sum of birth rate and death rate) and, in recent years, also the net turnover rate (*i.e.*, the difference between the birth rate and the death rate) of Italian firms at the national, regional and macro-sectoral level. A birth (death) amounts to the creation (dissolution) of a combination of production factors with the restriction that no other enterprises are involved in the event. Then, births (deaths) do not include entries into (exits from) the population due to mergers, break-ups, split-off or restructuring of a set of enterprises, as well as entries into (exits from) a sub-population resulting only from a change of activity³¹.

Figure 9. Business dynamism (net turnover rate) in Italy, total economy and industry (%), 2002-2017



Source: Istat

As of 2021, the last update dates back to July 2019 and covers the period 2012-2017, whereas the earliest available data refer to 2002. Since 2008, data on birth rate and death rate are also reported by Eurostat, which collects data on business demography from the national statistical institutes of the

³⁰ These series are based on the definition of income which has been used by OECD since 2012. Details on income definitions and on income components can be found at this link: <http://www.oecd.org/els/soc/IDD-ToR.pdf>

³¹ Indicators of business dynamism can also be computed using annual data on the number of firm registrations and cancellations to the business register, which are compiled by the Italian Chamber of Commerce. However, the inclusion criteria partly differ from the ones adopted by Istat; for instance, registrations (cancellations) to the business register can be also attributable to firm entries into (exits from) the population due to mergers, break-ups, split-off or restructuring of a set of enterprises.

EU members³². However, the Eurostat data for Italy, especially the ones referring to the death rate, do not perfectly coincide with the Istat data, probably because, unlike Istat, Eurostat does not regularly replace the estimates of the death rate with the official values once the latter become available. In addition, Eurostat itself recognizes that it is difficult to harmonize data coming from countries that use different definitions of business birth and death. For these reasons, we do not make comparisons between Italy and the EU in terms of business dynamism.

Figure 9 plots the average net turnover rate of Italian firms for both the total economy and the macro-sector “industry” (the main contribution to which is represented by the manufacturing sector) based on Istat data and referring to the period 2002-2017.

The net turnover rate referring to the total economy was negative in 11 out of 16 years, peaked in 2007, then went through a phase of decline and in 2013 inverted its trend again. In 2016, the birth rate and the death rate were approximately the same. The net turnover rate observed in the industry macro-sector follows a similar path, except for years 2004 and 2009, and, even though in the last years available was on the rise, it was systematically negative. All in all, the Italian economy and, in particular, the industry macro-sector exhibits a relatively poor performance in terms of business dynamism, even though it is likely that the economic recession has played a negative role, and it seems that, in recent years, it has started to improve.

3. Microeconomic Analysis of Market Power and the Labour Share of Income in the Italian Manufacturing Sector

The picture of the Italian economy that emerges from the descriptive analysis of Section 3 is somehow mixed: on the one hand, it displays a gradual but steady growth in labour force participation, an average trend in the labour share that is less worrying than the US one (especially if we consider the one based on Istat data), and an investment rate that has been recovering. At the same time, it exhibits some weaknesses, such as a low firms’ turnover rate (especially in the industry macro-sector, where it is always negative or around zero) and increasing income inequality, which have been regarded as possible symptoms of increasing product market power. In this section, we complement the overview of the macro-trends depicted in Section 2 by uncovering the recent trends in market power in Italy. Focusing on the manufacturing sector, which in this country still represents an important industry in terms of output and employment, we estimate firm-level markups, as well as a measure of labour market power, by estimating a production function. We also calculate the labour share of income and show how the dynamics of market power can help explain the trends in this important labour market outcome. The data come from the commercial database AIDA by Bureau van Dijk and cover the years 2011-2018. We retrieve information on revenues, labour costs, number of employees, the book value of the capital stock, expenditures on intermediate inputs (*i.e.*, materials), the industrial sector of activity and the year of birth of the firm. We merge these firm-level data with industry-level deflators of value added, intermediate inputs and tangible assets compiled by the National Statistical Office (Istat) and OECD-Stan. The raw data require intensive cleaning to net out the influence of measurement error and extreme values, and we exclude firms that remain in the sample for less than five consecutive years. The resulting dataset contains 277,883 observations.

3.1 Analytical Framework

In order to identify product and labour market imperfections in the Italian manufacturing sector, we first estimate the parameter of corporate markup drawing upon De Loecker and Warzynski’ s (2012) methodology. This approach assumes that firms minimize costs and at least one input (materials) is adjusted freely, while the other factors (capital and labour) may show frictions in their adjustment. Unlike previous contributions, this framework requires neither assumptions on demand and how firms compete, nor the computation of the user cost of capital, and provides firm-level, time-varying estimates while controlling for unobserved productivity.

By combining the optimal input demand conditions obtained from cost minimization with the standard definition of markup (*i.e.*, price over marginal cost), De Loecker and Warzynski show that the price-cost margin can be identified as the ratio of the output elasticity of materials and its revenue share:

$$\mu_{it} = \frac{\theta_{it}^M}{\alpha_{it}^M} \quad (1)$$

where μ_{it} is the markup of firm i at time t , θ_{it}^M is the output elasticity of materials and α_{it}^M is the revenue share of materials, also known as cost share or expenditure share of materials.

If $\mu_{it} = 1$, the firm operates in a product market characterized by perfect competition; if $\mu_{it} > 1$, there is imperfect competition in the product market and the firm owns some degree of product market power, namely, it charges a price that is higher than the marginal cost.

Then, we introduce our measure of labour market imperfections, that we label φ , as the ratio between the average labour cost paid by firms (w), which we observe in the data, and the marginal revenue product of labour (MRP^L):

$$\varphi_{it} = \frac{w_{it}}{MRP_{it}^L} \quad (2)$$

The parameter φ captures the wedge between the cost of an additional unit of labour and the revenue it generates (both in nominal terms); therefore, it is a measure of (labour) market power on the side of firms' employees. If $\varphi = 1$, the wage is equal to the marginal revenue product of labour and the labour market is competitive. On the other hand, any departure from unity signals frictions, stemming from either the existence of labour market power owned by the firms, resulting in $\varphi < 1$ and implying that the marginal revenue of labour is higher than the wage, or from some degree of market power by firms' employees ($\varphi > 1$). As Mertens (2019, 2020) and Caselli, Nesta and Schiavo (2021) demonstrate, φ can be expressed in terms of the ratio of the output elasticity of materials over the revenue-based materials share and the output elasticity of labour over the revenue-based labour share:

$$\varphi_{it} = \frac{\frac{\theta_{it}^M}{\alpha_{it}^M}}{\frac{\theta_{it}^L}{\alpha_{it}^L}} \quad (3)$$

where $\frac{\theta_{it}^M}{\alpha_{it}^M}$ represents the markup, θ_{it}^L is the output elasticity of labour and α_{it}^L is the revenue-based labour share of firm i at time t .

While the revenue shares can be easily computed using data from firms' balance sheets, the output elasticities need to be estimated. In the Appendix, we briefly illustrate how we estimate a firm-level production function that permits us to uncover the parameters θ_{it}^M and θ_{it}^L and then to compute our indicators of market imperfections.

3.2 Trends in Market Power

This section presents some descriptive analysis of our estimated parameters. **Table 1** reports the sectoral and total-manufacturing averages of the parameters μ and φ , by sector. A substantial degree of between-sector heterogeneity can be observed. While the "Rubber and plastic" sector exhibits among the highest degrees of product market power with an average price-cost margin of 1.24, "Chemicals and pharmaceuticals" shows an average price-cost margin of 1.163. As for labour market power, all sectors display a labour market power parameter above 1, implying that firms and workers engage in efficient bargaining resulting in some degree of market power that favours workers, except for the "Chemicals and pharmaceutical" sector.

Researchers and policymakers are typically more concerned about the dynamics, rather than the levels, of market distortions (for instance, in the US it is mainly the growth of the markups over a considerable number of subsequent years that has caused worries). Moreover, the absolute value is influenced by the model specification, making it difficult to draw comparisons between different studies.

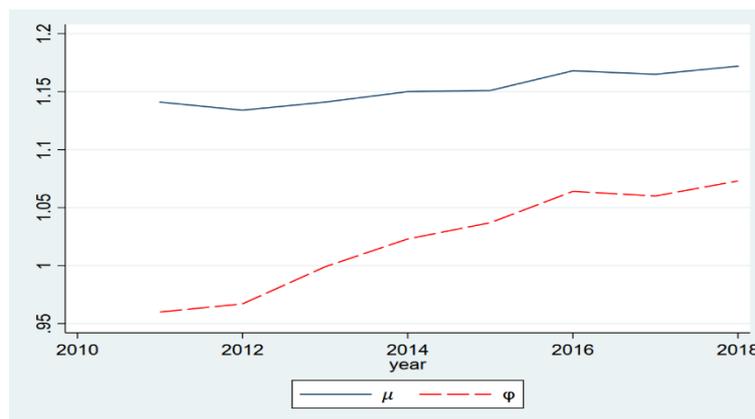
Table 1. Average market imperfection parameters by sector

| Sector | μ | φ |
|--|-------|-----------|
| Food, beverages and tobacco (10-12) | 1.204 | 1.311 |
| Textiles, apparel and leather (13-15) | 1.182 | 1.085 |
| Wood and paper products (16-18) | 1.198 | 1.048 |
| Chemicals and pharmaceuticals (20-21) | 1.163 | 0.932 |
| Rubber and plastic products (22-23) | 1.240 | 1.197 |
| Basic metals and fabricated metal products (24-25) | 1.227 | 1.077 |
| Computer, electronic and optical products (26) | 1.237 | 1.104 |
| Electrical equipment (27) | 1.221 | 1.168 |
| Machinery and equipment (28) | 1.194 | 1.046 |
| Transport equipment (29-30) | 1.230 | 1.163 |
| Other manufacturing (31-33) | 1.221 | 1.104 |
| Total manufacturing | 1.211 | 1.103 |

Notes: Number of observations = 277,883. The sectoral averages of the parameters are unweighted.

Accordingly, in **Figure 10** we document the trend of product and labour market power based on our sample of Italian manufacturing firms. Both the average values of μ and φ , which are weighted by the firms' revenue shares, have risen during the period under scrutiny. Specifically, μ grew by 2.7% between 2011 and 2018, signalling a positive but limited increase in product market power which, however, can be regarded as a "natural" recovery after the contraction experienced in the years of the economic recession and, more in general, after the gradual decline since the end of the nineties reported by previous research conducted by the Bank of Italy. Interestingly, φ experienced an 11.8% rise during the same period, indicating a shift of labour market power from the employers towards their employees. In a forthcoming study (with *-removed-*), we show that the increase in φ is mainly associated with the increase in the average gross nominal wage, which is mainly attributable to an increment in the compensation for employees, but which is likely to hide considerable between-worker heterogeneity, as data on wage inequality suggest. More information on how φ relates to the average wage and other variables can be found in Caselli, Nesta and Schiavo (2021).

Figure 10. Product and labour market power in the Italian manufacturing sector, 2011-2018



Source: authors' calculations based on firm-level data from Aida

3.3 Linking the Revenue-Based Labour Share with Market Imperfections

The evolution of product and labour market power can help explain the trend of another important variable which has been the object of intense scrutiny, namely the labour share of income. Drawing upon Mertens (2019), we show that a rising (falling) revenue-based labour share is associated with

increasing (decreasing) output elasticity of labour, decreasing (increasing) product market power, and increasing (decreasing) labour maker power detained by workers³³. Specifically:

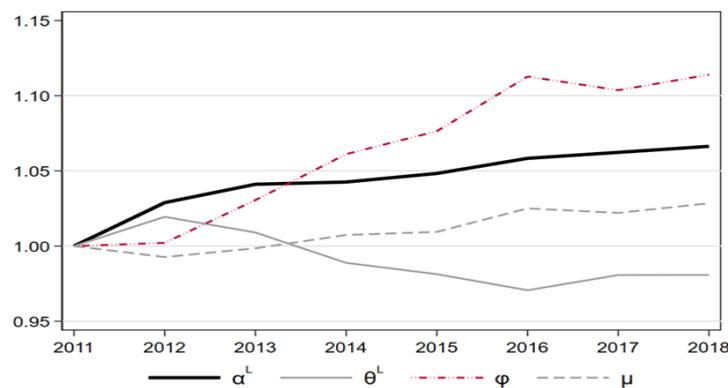
$$\alpha_{it}^L = \varphi_{it} \theta_{it}^L \frac{1}{\mu_{it}} \tag{5}$$

Taking the logs of equation (5) yields a simple linear expression that decomposes $\log(\alpha_{it})$ into three additive terms:

$$\log(\alpha_{it}^L) = \log(\varphi_{it}) + \log(\theta_{it}^L) - \log(\mu_{it}) \tag{6}$$

The dynamics of the labour share and its components are represented in **Figure 11**. Without claims on the direction of causality, we see that, in recent years, the (revenue-based) labour share³⁴ slightly increased despite the (muted) rise of the markup and the contraction of the output elasticity of labour. The negative contribution of θ^L and μ to α^L is indeed more than offset by the positive trend in φ . Accordingly, as expected, product market power is negatively correlated with the labour share, while it is positively correlated with our measure of labour market power. A diminishing output elasticity of labour, which is also detected by Mertens in the German manufacturing sector, may reflect a change in the firms' production technology that boosts capital intensity and reduces the importance of labour to firms. Moreover, in line with Mertens, it is in contrast with the assumption of constant output elasticities of factors, thus stressing the need to choose a translog specification, rather than a Cobb-Douglas one (which does not allow elasticities to vary).

Figure 11. Decomposition of the revenue-based labour share in the Italian manufacturing sector, 2011-2018 (2011 = 1)



Source: authors' calculations based on firm-level data from Aida

Conclusions

In recent years, a number of papers have attempted to shed light on the macroeconomic dynamics observed in some economies, especially in the US, which raise some concerns and which may be partly attributable to a rise in product market power. In this paper, we first review the vast and heterogeneous body of macro and microeconomic literature which investigates how changes in this variable influence five relevant macroeconomic variables, namely, domestic investment rate, labour share, labour force participation, income (and wealth) inequality and economic dynamism. Even though the studies under scrutiny differ considerably in terms of methodology, sample and proxy of product market power, and different countries typically experience quite dissimilar dynamics, from the review of the literature it emerges that a decrease in competition and a rise in product market power are

³³ In Mertens (2019), the indicator of labour market power φ is calculated as MRP_{it}^L/w_{it} , hence an increase in Mertens' φ corresponds to a shift of labour market power from the employees to the employers, namely to a rise in monopsony power. In equation (5), which can be recovered by simply rearranging the terms of equation (3), φ is computed as w_{it}/MRP_{it}^L , consistent with our definition of labour market power introduced in equation (2) and applied in the rest of this work.

³⁴ The value-added labour share, calculated as the ratio between compensation of employees and value added, exhibits a more ambiguous trend. We focus on the revenue-based labour share because it is the one that is linked to product (and labour) market power by the specific relationship captured by equation (5) and equation (6).

associated with a worsening of the socio-economic performance of the country under scrutiny in terms of the aforementioned macro-trends. Moreover, empirical evidence on the role played by product market power in economic dynamism, and especially in labour force participation, is still limited and may require more examination.

After reviewing the relevant literature, we focus on a specific country, namely Italy, for which we document the changes in the five selected variables using aggregate data and drawing some comparisons with other economies. According to this descriptive analysis, the Italian overall performance is quite mixed: even though it does not exhibit a marked decrease in the labour share, the investment rate, especially in the manufacturing, has been recovering after the economic crisis and labour force participation is constantly increasing over time, it has experienced low levels of business dynamism (especially in the industry macro-sector) and growing wage inequality.

Finally, after restricting the object to the manufacturing sector and the period 2011-2018, we recover the trends in corporate markups, as well as the trends in labour market power, using a rich firm-level dataset. Even though the average markup increased during the period under scrutiny, its increment is not particularly marked and can be interpreted as a market adjustment after a prolonged period of declining product market power. Moreover, this trend is accompanied by a shift of labour market power from the employers to the employees, which is driven by a growth in the average gross nominal wage and which helps explain the muted increase in the revenue-based labour share observed between 2011 and 2018. The empirical analysis strengthens the importance of accounting for both product and labour market power and allowing input elasticities to vary over time, and the result of the decomposition shown in Section 4.3 is in line with the literature reporting a negative link between product market power and the labour share.

We acknowledge that this paper has a mainly descriptive stance, and that the empirical analysis focuses on a relatively short period due to data limitations. Despite that, it provides a review of the literature on market power and an overview of the macro-trends and the market frictions in Italy which can boost further research on these topics. For instance, in a forthcoming paper (with *-removed-*) where we mainly focus on labour market power, we find that monopsony power still represents a relevant issue in some sectors and areas, and we assess how the introduction of a potential minimum wage (which has often been the object of debate, but which has not yet been implemented in Italy) may mitigate labour market frictions. Moreover, future research may analyse more in depth the patterns and sources of wage inequality and business dynamism, which represent two weaknesses of the Italian economy. As for wage inequality, recent data on wage and employment compiled by the European Union Statistics on Income and Living Conditions (EU-SILC) reveal that low-educated workers have been experiencing a wage compression, with a subsequent increase in the income gap between low-educated and high-educated workers. This suggests that initiatives aimed at boosting education, including on-the-job training, which help workers keep up with a rapidly changing environment and with the challenges implied by technological progress and help them move to other jobs and sectors, may attenuate wage dispersion and then inequality.

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*Note: the articles marked with an asterisk are quoted in the Appendix.

Appendix

Estimation of the production function

In Section 2, following De Loecker and Warzynski (2012), we defined the firm-level markup as the ratio between of the output elasticity of materials and its revenue share:

$$\mu_{it} = \frac{\theta_{it}^M}{\alpha_{it}^M}, \quad (1)$$

where μ_{it} is the markup of firm i at time t , θ_{it}^M is the output elasticity of materials and α_{it}^M is the revenue share of materials, also known as cost share or expenditure share of materials. While the expenditure share of materials can be easily computed using firm-level data that are generally available, the related output elasticity needs to be estimated.

In order to get unbiased estimates of θ_{it}^M at the firm-year level, we consider the following general production function Q for firm i at time t :

$$Q_{it} = Q_{it}(L_{it}, M_{it}, K_{it}, w_{it}), \quad (2)$$

where L_{it} , M_{it} and K_{it} are the firms' inputs (*i.e.*, labour, materials and capital, respectively) and w_{it} is firm's productivity. Unobserved productivity shocks are potentially correlated with input choices, and if not controlled for, can lead to inconsistent estimates of the production function. Accordingly, we employ the Wooldridge-Levinsohn-Petrin (WLP) estimator, as derived from Wooldridge (2009) and implemented in Petrin and Levinsohn (2012). The WLP estimator does not assume constant returns to scale, is robust to the Akerberg, Caves and Frazer's (2015) criticism of Levinsohn and Petrin's (2003) estimator and is programmed as a simple instrumental variable estimator. The potential endogeneity issues related to the simultaneous determination of inputs and unobserved productivity are addressed by introducing lagged values of specific inputs as proxies for productivity.

Specifically, the estimation strategy used in this paper consists in two steps.

First, we run:

$$q_{it} = g(l_{it}, k_{it}, m_{it}) + \epsilon_{it}, \quad (3)$$

where we use a third-order polynomial on all inputs to remove the random-error term ϵ_{it} from the output and hence to obtain estimates of the expected output \widehat{q}_{it} . Then, we use a general production function of the following type:

$$\widehat{q}_{it} = f_s(l_{it}, k_{it}, m_{it}, B) + \omega_{it} + \varepsilon_{it}, \quad (4)$$

where \widehat{q}_{it} is the natural log of real sales of firm i at time t , l_{it} , k_{it} and m_{it} are, respectively, the natural logarithms of the quantities of labour, capital and materials used by the firm and that get transformed into the output according to the production function f_s , B is the parameter vector to be estimated in order to calculate the output elasticities, ω_{it} is the firm-level productivity term that is observable by the firm but not by the econometrician, and ε_{it} is an error term that is unobservable to both the firm and the econometrician. Productivity is, thus, assumed to be Hicks neutral and specific to the firm, as in the approach using inputs to control for unobservables in production function estimations (Akerberg, Caves and Frazer 2015; Levinsohn and Petrin 2003; Olley and Pakes 1996). We assume that labour is a variable input, and instrument current labour and materials and their interactions with the first and second lags of labour as well as the second lags of capital and materials. To control for time-variant shocks common to all plants, we add year fixed effects.

We adopt a translog specification, which, unlike the Cobb-Douglas, permits us to recover firm-level time-variant output elasticities. The production function is a revenue function, since data on firms' output prices are not available, and is allowed to change across different sectors, as implied by the subscript s . Leaving subscripts i and t aside for simplicity, the translog function f_s can be written as:

$$f_s = \alpha + \beta_L l + \beta_K k + \beta_M m + \beta_{L^2} l^2 + \beta_{M^2} m^2 + \beta_{K^2} k^2 + \beta_{KL} kl + \beta_{KM} km + \beta_{LM} lm \quad (5)$$

Thus, the parameter vector is made up of nine parameters for each sector.

The estimated parameters of the translog production function allow us to compute the output elasticity of materials. Using the estimates of the output elasticity and the calculated revenue shares of materials, we can now compute markups at the firm-year level based on Equation (1).

MODELING COMMERCE IN TERMS OF CHEMICAL REACTIONS

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Abstract:

After first explaining the basis for such modeling, namely, changes in money in commerce appearing to mirror changes in free energy in coupled chemical reactions, with a striking correspondence between profit and reduction in free energy, a model of two 'coupled Deliveries' is constructed, noting the need also to model supply and demand, and using the somewhat literal example of a taxi journey up a hill, to help make sense of the approach. The modeling of supply and demand is then explained, the effect on prices being attributed to the spreading-out of energy from sellers to buyers. An expression for this effect is then derived, in terms of the corresponding concentrating of money. Various implications of the model are then expounded, concerning the nature of money, price and its relationship to value, and intelligence, and some supporting evidence given. Two secondary implications, concerning economics and political science, are then discussed to conclude.

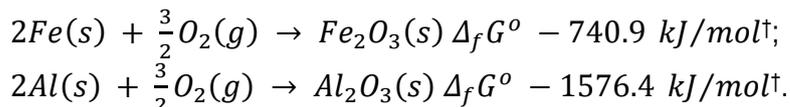
Keywords: modeling; commerce; coupled chemical reactions; thermodynamics; free energy; theory of value; intelligence; political science.

JEL Classification: A12; E37; R15.

Introduction

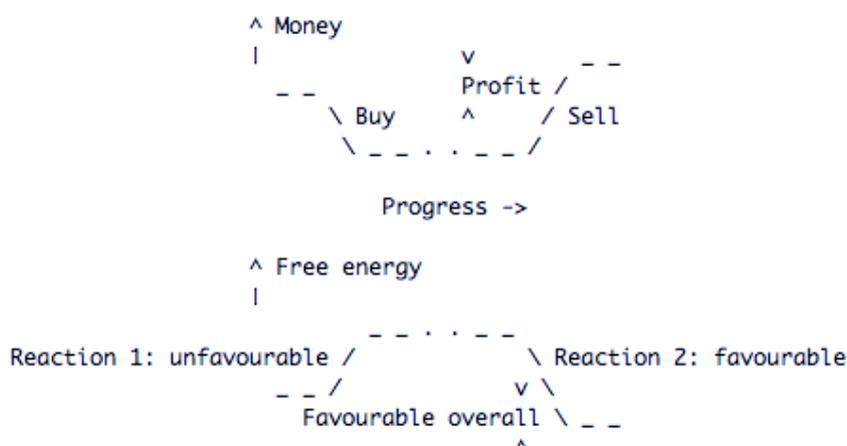
The idea for such a model is based on the observation that the changes in money in commerce mirror the changes in free energy in coupled chemical reactions, as shown in Figure 1. Thus, in commerce, a purchase is made (money goes down) with a view to making a sale that outweighs the purchase (money goes up to a greater extent); in coupled chemical reactions, an unfavorable reaction is forced to proceed (free energy goes up) by its being coupled to a favorable reaction that outweighs the unfavorable one (free energy goes down to a greater extent).

For an example of some coupled chemical reactions, consider the formation of the following oxides:

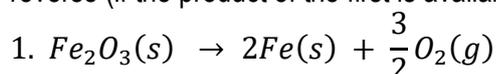


† (Brian Smith, Appendix I)

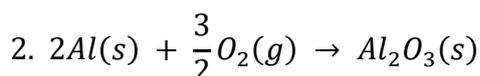
Figure 1. Commerce vs coupled chemical reactions



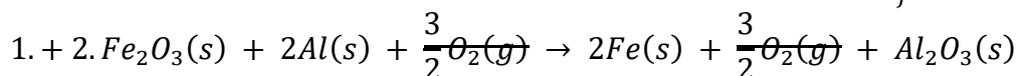
The second reaction is so much more favorable than the first that the second can force the first to go in reverse (if the product of the first is available) in order to acquire the oxygen that way:



$$\Delta_r G^\circ + 740.9 \text{ kJ/mol};$$



$$\Delta_r G^\circ - 1576.4 \text{ kJ/mol};$$



$$\Delta_r G^\circ - 835.5 \text{ kJ/mol}$$

$$(740.9 + -1576.4).$$

What is particularly striking is the correspondence between the requirement that a profit be made, in order that the purchase is entered into, and the requirement that the two coupled reactions be favorable overall, in order that the unfavorable reaction can proceed. Furthermore, the readiness with which the purchase is entered into is proportional to the size of the profit, and this too corresponds with reaction favorability being proportional to the size of the net decrease in free energy. For this reason, we will also now regard the purchase and sale as being coupled.

1. Constructing the Model

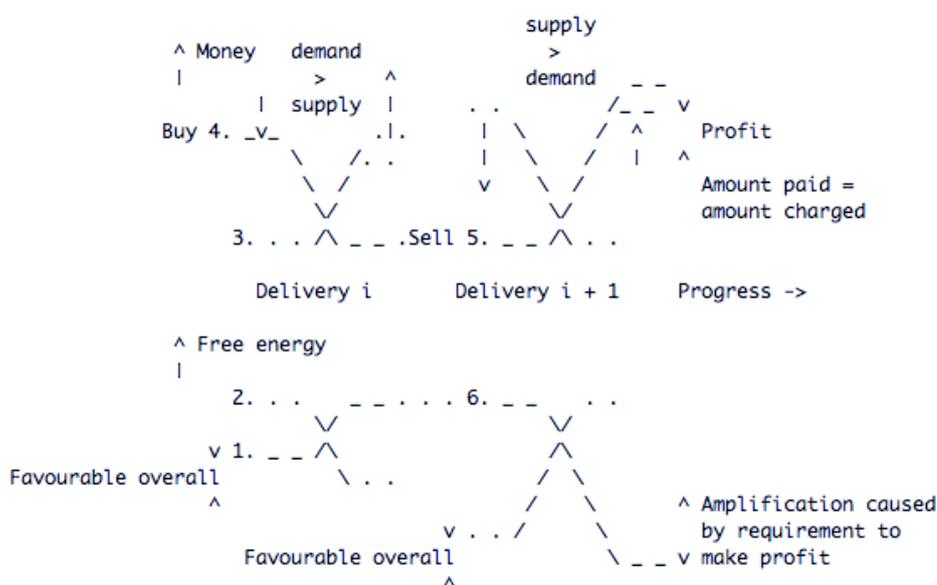
Now, given that every purchase is somebody else's sale, we proceed by overlaying each change in money and free energy with one in the opposite sense, and therefore now refer to the original (coupled) purchase and sale as (coupled) 'Deliveries', as shown in Figure 2.

Since we are using the two reactions in Figure 1. to model separate activities, we now consider them to be coupled indirectly, along the route labelled 1. to 6. Here, the direct coupling occurs between each reaction and the one that overlays it (changes 1. and 2.), with the coupling between the separate activities being made possible by the non-directly-physical nature of the coupling between a purchase and a sale (changes 4. and 5.).

There are several other points to note. Whereas the magnitude of each change in money matches that of the one it overlays (since the amount paid must equal the amount charged), this is not the case for the changes in free energy that they mirror, since the magnitude of the change in free energy of the favorable reaction must always outweigh that of the unfavorable one (in order that the overall reaction is favorable). The favorable reaction is the one mirrored since this reflects the actual effort the seller goes to and therefore charges for in order to do the required amount of work for the

buyer. As well as the coupling between purchase 4. and sale 5., which inclines the buyer to select the offering of the Delivery-i product or service with the lowest price tag, there is also coupling between sale 3. and the purchase of Delivery i - 1 (not shown), which inclines the seller to put the highest possible price tag on their offering of the Delivery-i product or service, that the market for it will bear. Thus, it is the market for the product or service in question, as in the balance of supply versus demand, henceforth, supply and demand, that determines the resultant effect of these two opposing 'forces', and this we must therefore also model. Figure 2. depicts an occasion when the market is on the side of the seller of Delivery i, and the buyer of Delivery i + 1. Finally, the requirement that a profit should always be made requires that the price of Delivery i + 1 should always exceed that of Delivery i, which suggests that change 6. should always exceed change 2.

Figure 2. Coupled Deliveries



2. Example Product or Service: Taxi up a Hill

Our model represents each Delivery as a pair of (directly) coupled reactions, and one kind of product or service that illustrates why this might make sense is a taxi journey up a hill.

Thus, the work to be done is literally, to drive something (somebody) up hill, while the favorable reaction to which this is coupled (by the taxi's engine and transmission) is the combustion of the taxi's fuel.

The factors affecting the price are as follows: the higher the destination, the larger change 1. in Figure 2., and therefore the higher the price; the more efficient the taxi, the smaller the difference between | change 2. | and change 1., and therefore the lower the price; the more that demand exceeds supply, the more the price (change 3.) will exceed the amount that mirrors change 2.

3. Modeling Supply and Demand

3.1. Consumption of Free Energy Means Energy Spreads Out

So, a favorable reaction (or coupled pair of reactions) is favorable because it brings about a reduction in free energy. But what does this actually mean? It does not mean a reduction in energy, since energy is conserved (Atkins, 54). What it means is that the energy has become more spread out – or put more formally, entropy (S) has increased (Atkins, 131). Some other examples of this tendency of energy to spread out, that are easier to appreciate, include the wave that radiates on the surface of a pond into which a stone has been dropped - the spreading-out of kinetic energy - and the cooling of a hot drink - the spreading-out of heat energy.

3.2. Energy Spreads Out When Demand Exceeds Supply

Notice that each Delivery involves the transfer of energy - change 1. in Figure 2. - from seller to buyer. Therefore, if there are more buyers than sellers (as is the case when demand exceeds supply), energy will be spreading out.

However, this is rather a strange example of energy spreading out, since the spreading-out has been driven by buyers and sellers seeking to maximize their respective profits, as discussed earlier. Therefore, at first sight, it would appear that energy has been able to spread out without there being any reduction in free energy. However, there is also the small matter of the increase in the price, change 3. minus |change 2.|. We are therefore bound to conclude that *this increase in the price is the manifestation of the reduction in free energy brought about by the spreading-out of energy when demand exceeds supply.*

3.3. Money Concentrates When Energy Spreads Out

The fact that an increase in the price should be a manifestation of a decrease in free energy is in keeping with the mirroring observed in the introduction. It is explained by the fact that the money is being transferred in the opposite direction to the energy and is therefore concentrating - a positive change in the concentration - rather than spreading out - a negative change.

Just as the amount of spreading-out of energy is a measure of the reduction in free energy, so the amount of concentrating of money is a measure of the increase in the total amount of money spent by all the buyers due to the increase in the price of each Delivery. If we consider a fixed number of buyers and sellers, and imagine the total amount of money spent to be first concentrated over the buyers, and then concentrated over the sellers, then the amount of concentrating of money is this change in concentration, which may be expressed as follows:

$$\frac{(\text{total amount spent})/(\text{number of sellers})}{(\text{total amount spent})/(\text{number of buyers})},$$

$$\text{or } (\text{total amount spent}) * [1/(\text{number of sellers}) - 1/(\text{number of buyers})].$$

If we take this to *be* the increase in the total amount of money spent (as opposed to just a measure of it), then the fraction of the total amount spent that is due to demand exceeding supply will be given by,

$$1/(\text{number of sellers}) - 1/(\text{number of buyers}).$$

4. Implications of the Model

4.1. Money as a Form of Energy

The fact that we now ascribe the difference between change 3. and |change 2. | in Figure 2. to a reduction in free energy implies that the coupling that occurs between these two changes can be regarded as being similar in nature to that which occurs between change 2. and change 1. - namely, a conversion from one form of energy into another, where the reduction in free energy may be regarded as the 'cost' of that conversion. In other words, the model implies that money is a form of energy.

Let us turn once again to the taxi example to illustrate this. Just as the cost of the conversion of chemical energy (fuel) - change 2. - into potential energy (ascending the hill) - change 1.- depends on the efficiency of the taxi, so the conversion of money - change 3. - into chemical energy (fuel) depends on the 'efficiency' afforded by supply and demand - for example, this will be 'less efficient' if demand for taxis (and therefore fuel) exceeds supply.

Note that, whereas the conversion of chemical energy into potential energy is a *transformation* of one physical form into another, the conversion of money into chemical energy is an *exchange* of a non-physical form into a physical form, where both forms existed beforehand and continue to exist afterwards, but it is nevertheless a conversion from the point of view of the buyer or seller. However, the fact that the exchange involves the money being transferred in the opposite direction to that of the

physical form of energy means that money concentrates whenever the physical form spreads out, as discussed earlier.

4.2. Price versus Value

Figure 2. gives us a clear visualization of price - change 3. - in relation to the value it represents - change 1. - implying that price is composed of the value together with the two conversions 'costs' described above.

4.3. Utilization of Intelligence

In Figure 2., we have already observed that the coupling between the Deliveries - between changes 4. and 5. - is non-directly-physical, and here we make the further observation that this is dependent on intelligence: Delivery $i + 1$, together with the reduction in free energy it gives rise to, is only brought about in order to recover the investment made in Delivery i , together with a profit - it would not otherwise take place; the same goes for Delivery i itself, since it is similarly coupled to Delivery $i - 1$ (not shown). This implies that intelligence is being 'utilized' in order to bring about the consumption of free energy. If this is not the ultimate 'purpose' of intelligence, perhaps it is the other way round - the ultimate purpose of the consumption of free energy is to bring about intelligence.

4.4. Advent of Money as Key Threshold for Intelligent Life

As soon as intelligence crosses the threshold required to conceive of money, the above 'utilization' comes into play. While this makes possible the consumption of free energy by a mechanism that was not previously available, a key point to note is that this necessarily involves 'the driving of taxis up hills'. As explained above, this is the transformation of one form of energy into another, where the amounts involved are greater than the amount of free energy consumed, and therefore more significant. This implies a significant transformation of the surroundings of the intelligent life in question.

5. Supporting Evidence

5.1. Money as a Form of Energy

Although, unlike energy, money is created (when banks make loans or buy assets), this may be seen as money being made available in response to corresponding amounts of energy becoming available: a buyer borrows the money in order to pay the seller - change 4. in Figure 2.- who makes use of that energy - change 2.

Like energy, money is never destroyed. Although it is possible to destroy legal tender, our intelligence prevents this.

The model implies that money is a non-physical form of energy that is converted into physical forms by exchange rather than transformation, such that it concentrates whenever the physical form spreads out. Since physical forms have a tendency to spread out (since this corresponds to a reduction in free energy), this implies that money has a tendency to concentrate. Evidence of this is the 2016 statistic (5.) that the richest 1% had as much wealth as the rest of the world combined. Further evidence is the existence of national lotteries, where large numbers of people willingly and regularly pay small amounts of money to a central authority that then pays back large amounts to only a few of them (selected at random).

5.2. Parallels between Commerce and the Living World

Consider the metabolism (Stryer 274, 479) of an organism that derives its energy from food. Work such as biosynthesis (anabolism) is made possible by coupling it to the breaking down of the food (catabolism). This is very similar to the coupling of change 1. in Figure 2. to change 2., that we have used to model a Delivery.

Just as the efficiency of the taxi (in the example) will determine how much fuel will be required, and therefore the magnitude of change 2., so the efficiency of the organism's metabolism will determine how much food will be required in order to sustain the organism.

And just as the amount of fuel required will in turn determine how many Deliveries can be made, so the amount of food required will determine how many organisms can be sustained.

Finally, just as competition between taxi service providers will see taxis that employ innovations that improve their efficiency displace others, so competition between species for food will see organisms with more efficient metabolisms displace others. A key point to note here is that, in both cases, even though the increase in efficiency reduces the amount of free energy consumed per Delivery or organism, it results in an increase in the number of Deliveries or organisms, such that the total amount of free energy consumed still increases.

5.3. Transformation of Surroundings by Humans

It would be remiss of us not to begin with the taxi being driven up the hill. As explained, this transforms chemical energy into potential energy, which involves transforming fuel and oxygen into mainly carbon dioxide and water. Given that carbon dioxide is known to persist in the atmosphere, and to absorb heat energy that would otherwise have radiated out into space, Deliveries of this nature are thought to be contributors to climate change (7.).

A more visible transformation of the surroundings is to be found in the case of Deliveries that entail the destruction of rainforests (4.).

Perhaps most strikingly, one could imagine that the night side of the Earth as seen from space would look a lot less interesting if money had yet to be conceived of, not to mention space as seen from the night side of the Earth (6.).

6. Secondary Implications

6.1. Implication for Economics

The implications that money is a (non-physical) form of energy (that may be converted into physical forms by exchange), that commercial transactions may be modeled as coupled pairs of chemical reactions, and that the effect of demand exceeding supply on prices may be explained as the manifestation of the reduction in free energy that arises when energy spreads out from sellers to buyers, all in turn imply that there is, after all, a foundation for economics in the natural sciences.

6.2. Implication for Political Science

The tendency towards increasing numbers of organisms that are more efficient (as well as increasing numbers of Deliveries that are more efficient) implied by the earlier discussion on parallels between commerce and the living world must therefore apply to humans, but with two important differences, on account of our intelligence: we can choose not to reproduce, and we can engage in commerce. In other words, we have the option of consuming free energy by making Deliveries rather than babies. This in turn implies that a foundation for political science, also, is to be found in the natural sciences.

Conclusion

Based on the observations discussed, it is possible to construct a model of buying and selling in terms of coupled chemical reactions, in which money behaves as a non-physical form of energy that is converted into physical forms by exchange rather than transformation, and the effect on prices of demand exceeding supply is explained as the manifestation of the reduction in free energy due to the spreading-out of energy from sellers to buyers. A clear definition of price in terms of the value it represents emerges, and a simple expression for the effect of demand exceeding supply on the total amount spent in the case of fixed numbers of buyers and sellers can be obtained.

When advances in the intelligence of an organism, brought about in the pursuance of a more efficient metabolism - acquiring and pre-processing the food to be broken down must also be taken into account - cross the threshold required to conceive of money, the model implies that a new, more effective mechanism for consuming free energy becomes available, that is, at the same time, a new,

more effective mechanism for the advancement of intelligence. This mechanism, as described by the model, involves the transformation of large amounts of energy relative to the amount of free energy consumed, such that the impact of the intelligent life on the surroundings is much greater than before.

The above implications in turn imply that the social science of economics has a foundation in the natural sciences.

Finally, the implication that humans have a choice about how they wish to consume free energy in turn implies that political science, too, has such a foundation.

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CREDIT LIBERALIZATION REFORM: A SIMPLE MODEL

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Abstract:

This note presents a simple setup of credit liberalization. We find that the effect is not uniform but depends on the level of GDP. In other words, the model predicts that richer countries benefit more than poor countries from opening up their capital account. This finding has important policy implications, as it suggests that developing economies should be cautious when it comes to the liberalization of their capital account.

Keywords: credit liberalization; capital account reform.

JEL Classification: E24; E32.

Introduction

The model follows closely the setup proposed by Adam (2009) in the discussion of Abiad, Leigh and Mody (2009). The setup is a 2-period model, where the insights can be easily extended to a multi-period setup.

$$\max_{(c_1, c_2, d, k)} \ln c_1 + \beta \ln c_2 \quad (1)$$

s.t.

$$c_1 \leq y_1 + d - k \quad (2)$$

$$c_2 \leq Ak - dR \quad (3)$$

$$d \leq \theta \frac{y_2}{R} = \theta \frac{Ak}{R} \quad (4)$$

where $0 < \beta < 1$ is the discount factor, and c_1, c_2 are consumption levels in period 1 and 2, respectively. The gross interest rate is $1 + r = R > 1$ (Where r denotes the net interest rate) is exogenously given, as well as y_1 , which is the level of output in period 1. $y_2 = Ak$ is the output in period 2, which is endogenously determined by an Ak-type production function, where A is the level of total factor productivity in period 2, and k denotes (both investment and) the stock of physical capital. Thus, A is also the marginal return to capital, with $A > R$. d denotes borrowing ("debt"). Finally, $\theta \in (0, R/A)$ is the parameter that will capture the degree of credit imperfection ("borrowing constraints"), with $\theta = 0$ representing total exclusion from capital markets. Similarly, an increase in θ , as in Adam (2009), will be interpreted as an increase in the country's degree of financial integration.

It is easy to show that in this 2-period model, the borrowing constraint will be binding. The other constraints from the budget set will also hold with equality. The model can be reformulated, and the expressions for $\{c_1, c_2, d\}$ could be substituted back into the utility function to produce

$$\max_k \ln(y_1 + \theta \frac{Ak}{R} - k) + \beta \ln(Ak - \theta Ak) \quad (5)$$

FOC:

$$k: \frac{\theta \frac{A}{R} - 1}{y_1 + \theta \frac{Ak}{R} - k} + \beta \frac{A - \theta A}{Ak - \theta Ak} = 0 \quad (6)$$

or

$$\frac{\theta \frac{A}{R} - 1}{y_1 + \theta \frac{A}{R} - k} + \frac{\beta}{k} = 0, \quad (7)$$

Rearranging

$$(1 - \theta \frac{A}{R}) k - \beta(\theta \frac{Ak}{R} - k) = \beta y_1, \quad (8)$$

$$(1 - \theta \frac{A}{R}) k + \beta k(1 - \theta \frac{A}{R}) = \beta y_1, \quad (9)$$

$$(1 + \beta)(1 - \theta \frac{A}{R}) k = \beta y_1, \quad (10)$$

$$k = \frac{\beta y_1}{(1 + \beta)(\frac{\theta A}{R} - 1)}, \quad (11)$$

Thus

$$\frac{d}{y_1} = \frac{\theta Ak}{R y_1} = \frac{\theta A}{R} \frac{\beta}{(1 + \beta)(1 - \theta \frac{A}{R})} = \frac{\beta}{(1 + \beta)(\frac{\theta A}{R} - 1)}, \quad (12)$$

The implied gross growth rate of output (per capita) is:

$$1 + g = \frac{y_2}{y_1} = \frac{Ak}{y_1} = \frac{A}{y_1} \frac{\beta y_1}{(1 + \beta)(\frac{\theta A}{R} - 1)} = \frac{\beta A}{(1 + \beta)(\frac{\theta A}{R} - 1)}, \quad (13)$$

Relaxing the credit constraint then leads to higher growth:

$$\frac{\partial g}{\partial \theta} = \frac{\beta A}{1 + \beta} \left[\frac{1}{(1 - \theta \frac{A}{R})^2} \right] \frac{A}{R}, \quad (14)$$

This is because an increase in θ increases borrowing (d), or

$$\frac{\partial d}{\partial \theta} = \frac{\beta y_1}{1 + \beta} \left[\frac{1}{(\frac{R}{\theta A} - 1)^2} \right] \frac{R}{\theta^2 A} > 0, \quad (15)$$

which in turn increases investment in capital k , as

$$\frac{\partial k}{\partial \theta} = \frac{\beta y_1}{1 + \beta} \left[\frac{1}{(1 - \theta \frac{A}{R})^2} \right] \frac{A}{R} > 0, \quad (16)$$

and thus increases period-2 output:

$$\frac{\partial y_2}{\partial \theta} = \frac{\partial(Ak)}{\partial \theta} = A \frac{\partial k}{\partial \theta} = \frac{\beta A y_1}{1 + \beta} \left[\frac{1}{(1 - \theta \frac{A}{R})^2} \right] \frac{A}{R} > 0, \quad (17)$$

Given the exogenously given y_1 , then it leads to higher growth. This is also the transmission channel that the empirical strategy tries to capture in Abiad *et al.* (2009).

As suggested by Adam (2009), the problem above produces non-linear effects of credit liberalization. The marginal effects from relaxing the credit constraint are small for small values of θ , but when $\theta \rightarrow (\frac{R}{A})_-$, borrowing and output growth become more sensitive to further liberalization, or $\frac{\partial k}{\partial \theta}, \frac{\partial d}{\partial \theta}, \frac{\partial y_2}{\partial \theta}, \frac{\partial g}{\partial \theta} \rightarrow \infty$. However, the model in its current simple form predicts that the size of the country does not matter for the effect of credit market liberalization (which is inconsistent with the empirical findings).

In particular, the setup predicts that a country's debt-to-output ratio is independent of the country's income level, or:

$$\frac{\partial(d/y_1)}{\partial y_1} = 0. \quad (18)$$

As a consequence, there is no interaction between an individual country's degree of credit liberalization and income, or

$$\frac{\partial^2(d/y_1)}{\partial y_1 \partial \theta} = 0. \quad (19)$$

Yet, the empirical findings show this not to be true.

In order to make the model consistent with empirical findings, we need to assume that the profitability of investment projects (*i.e.*, the return to capital) varies with the country's levels. In particular, the marginal return on a project is higher in a low-income country (due to the relative scarcity of capital), or: $A=A(y)$ with

$$A'(y) = \frac{\partial A}{\partial y} < 0. \quad (20)$$

This assumption is implicitly derived from a production function, which is concave in the capital stock (which is also per person, as there is an infinitely lived representative agent in the economy).

Some of the countries might be poor because of the existence of borrowing constraints, which prevents them from growing optimally due to the inability to invest and accumulate the efficient level of physical capital. With this extension

$$k = \frac{\beta y_1}{(1+\beta)(1-\theta \frac{A(y)}{R})} \quad (21)$$

and

$$\frac{d}{y_1} = \frac{\beta}{(1+\beta)(\frac{R}{\theta A(y)} - 1)} = \frac{\beta \theta A(y)}{(1+\beta)(R - \theta A(y))}, \quad (22)$$

which implies that

$$\frac{\partial(\frac{d}{y_1})}{\partial \theta} = \frac{\beta}{1+\beta} \frac{\theta A'(y)}{(1+\beta)(R - \theta A(y))^2} < 0, \quad (23)$$

which implies that relatively poorer countries will borrow more (temporarily). Also

$$\frac{\partial g}{\partial \theta} = \frac{\partial}{\partial \theta} \left[\frac{\beta R A(y)}{(1+\beta)(R - \theta A(y))} \right] = \frac{\beta R [A(y)]^2}{(1+\beta)(R - \theta A(y))^2} > 0, \quad (24)$$

so liberalizing credit markets leads to higher per-capita growth, and in addition,

$$\frac{\partial^2 g}{\partial \theta \partial y} = \frac{\beta R}{(1+\beta)(R - \theta A(y))^2} 2A'(y)A(y)[R - \theta A(y)][R + (R - 1)\theta A(y)] > 0, \quad (25)$$

or richer countries benefit more from credit liberalization (and grow faster)

Conclusions

This note presents a simple setup of credit liberalization. We find that the effect is not uniform, but depends on the level of GDP. In other words, the model predicts that richer countries benefit more than poor countries from opening up their capital account. This finding has important policy implications, as it suggests that developing economies should be cautious when it comes to the liberalization of their capital account.

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THE EUROPEAN MONETARY INTEGRATION TRAP: INCOMPLETE SOVEREIGNTY AND THE STATE-MIMICKING METHOD

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Abstract:

The author identifies the two main (external and internal) dimensions of incomplete sovereignty in the EMU and the respective caveats affecting the scope of the single monetary policy, here described as a 'monetary policy integration trap'. The author details the main implications caused by this curtailed sovereignty both in its external and internal dimensions – e.g. on the one hand, the polarisation of external positions and, on the other hand, the effects of limited European fiscal/budgetary sovereignty and the atypical interaction between the latter and the single monetary policy. Finally, the way the E(M)U has in recent years addressed this integration trap is analysed, making use of a heterodox method here labelled as the 'State-mimicking' method. The main conclusion is that such a method is the possible yet imperfect policy solution to bypass the monetary policy integration trap, given the E(M)U's ontological ambiguities - a quasi-State afraid to become one.

Keywords: sovereignties; balance of payments; monetary policy; integration trap; state-mimicking method.

JEL Classification: E52; F15; F36.

Introduction

The Economic and Monetary Union (EMU) is a territory with a single monetary policy, centralized in an (apparent) sovereign fashion at the European level, yet diminished by retained sovereignties in its member states: therefore, the EMU is a space of incomplete sovereignty. The objective of this article is twofold. On the one hand, it aims to analyse the two main (external and internal) dimensions of this incomplete sovereignty and the respective caveats affecting the scope of single monetary policy, an endogenous limitation posed by the boundaries of such incomplete sovereignty and here qualified as a 'monetary policy integration trap'. This limitation becomes more disturbing in times of severe crisis, as were the 2010 sovereign debt and the COVID-19 crises and now the Russia-Ukraine war, and when the appeal for more centralization of powers at the E(M)U level¹ becomes *naturally* stronger. On the other hand, the article intends to shed some light on the way the EMU (as the EU as whole) has in recent years addressed this integration trap and will probably do in the near future, making use of a heterodox and unique method (considering other integration experiences around the world), which I label as the

¹ I will use the acronym E(M)U when I am indistinctly considering the EMU and the European Union (EU) as a whole. For certain analytical purposes it is not interesting to make such a distinction, but whenever required, the distinction will be made.

'State-mimicking' method.

The sequence of the article will be as follows. In section 2, I start by analysing monetary integration in Europe before the creation of EMU. As we will see, the EMU was not sufficient to overcome the monetary integration trap. Then, in section 3, I analyse the two dimensions of the incomplete sovereignty trapping the exercise of the single monetary policy - on the one hand, I address the incompleteness externally, given remaining State members (national) Balance of Payments (BoP) and the polarisation of external positions and financial flows, highlighting some of the respective implications, e.g. the functioning of the EMU payment system; on the other hand, I analyse the sovereignty incompleteness internally, notably weakly centralized fiscal and budgetary policies, while also explaining the way in which this leads to an anomalous design of the EU budget and undermines proper interaction between monetary and fiscal policies at the EMU level. Then, in section 4, I present the 'State-mimicking method', how it seeks to address those sources of incomplete sovereignty, the respective shortcomings, following the same order - firstly, externally, I mention the macroeconomic imbalance procedure and its limitations in addressing remaining national BoP and then I analyse the seminal limitation to building a complete Capital Markets Unions due to the national biases of the remaining financial markets; secondly, and internally, I describe the atypical proposals made at the E(M)U level to overcome the inexistent fiscal union, identifying their peculiar features and insufficiencies.

1. From the European Monetary System to the EMU: The Remaining Misalignments of the Euro

The EMU as a currency area can be described as an extreme version of a fixed exchange rate system² where previous national currencies were fixed both between each other and with respect to a new currency (the euro), and this fixing occurred in an irrevocable manner (Cabral 2021a). The euro as a store of value and unit of account implicitly corresponds on a weighted basis to the value of the pioneering European currencies adopting the euro. In fact, the value of the Euro was, on the date of its legal inception (31 December 1998) equivalent on a one-to-one basis to its embryo and predecessor, the ECU. The ECU in turn was a basket-type currency in which however the Deutsche mark ended up being dominant. Indeed, as noted by Haldane (1991, p. 74), this latter currency became acknowledged, within the European Monetary System, EMS (set up in 1979), "as the *de facto* nominal anchor of the European Exchange Rate Mechanism (ERM), just as the dollar became the *de facto* nominal anchor under Bretton Woods - BW". Furthermore – as also noted (Haldane 1991, 74) – the ERM's operation became marked by an asymmetry with the burden of adjustment, as under BW, carried disproportionately by the weak currency countries. Two main reasons are added to explain such German dominance in the system (*Idem* p. 74): *i*) on the one hand, the fact that the other participating currencies (notably, from high-inflation countries) voluntarily accepted to 'import' Germany's credibility via an exchange rate peg with the Deutsche Mark – this would be the benefit of 'tying one's hands' via exchange rate targeting in order to control/reduce inflation levels; *ii*) on the other hand, because under a fixed exchange rate regime, the countries building up their stock of reserves the fastest will be those with the most restrictive monetary stance; conversely, those countries following the most expansive monetary policy will be losing their reserves the fastest. In sum, "since a country's stock or reserves is finite, the burden of adjustment is more often placed upon the expansionary /weak currency country (whose stock of reserves is being depleted) than upon the contractionary/strong currency (whose reserves are being added to). The weak currency will therefore be forced to tighten policy to hold the exchange rate fixed, with the strong currency country insulated from this policy adjustment" (Haldane 1991, 74-75).

Ultimately this asymmetric requirement for adjustment reflects, in turn, the very operational nature of fixed exchange rate regimes (especially when they rely on an implicit leading absorbent currency):

² Following Frankel's (1999) lesson, fixed exchange rates are constrained by the so-called 'impossible trinity': this principle states that a country should give up one of the following policy goals: capital mobility, fixed exchange rates, or autonomous monetary policy.

the dominant currency country implicitly 'centralizes' monetary policy (e.g. the fixation of the short-term interest rate), whereas for the dominated currency countries the other currency stability tool basically remains – foreign exchange intervention. This same idea is stressed by Haldane (1991, p. 75) for whom in the adjustment mechanism Germany, as an inflation leader, would target nominal interest rates and the other ERM countries would mostly target foreign exchange reserves.

This is also, in turn, one of the 'natural' outcomes of the abovementioned 'impossible trinity'. Assuming weak (or ineffective) capital controls, a fixed exchange rate system involves countries abdicating from their monetary policy independence: this can actually occur by implicitly delegating such policy to the dominant currency country. The problem arises when this implicitly centralized policy in the dominant country becomes incompatible with the other countries macro adjustment needs.

Recall, in this respect, the speculative attacks suffered by the British pound during the Summer of 1992, ultimately leading to the collapse of the EMS. Usually, these attacks are attributed to two main causes: firstly, due to doubts about the progress toward monetary union after the rejection of the Maastricht Treaty (including the creation of the EMU) in the June 1992 Danish referendum; secondly, to the weak commitment of the British authorities towards the fixed exchange rate, expressed for example by the reluctance shown by these authorities to allow, as a response to the speculative attack, short-term interest rates to rise in defence of the currency – this was hence a speculative self-fulfilling attack (Zurlinden, 1993, pp. 54-56). If these reasons are valid, also true was the nationally biased intervention from the German authorities as a response to such increasing tensions during that Summer. In fact, the adjustments made by the Bundesbank (the first cuts in interest rates in nearly five years) were perceived as small by the markets (Zurlinden 1993, 44). The refusal of the German authorities to go further in their monetary policy response – at a time where the country was still adjusting from the shock of reunification – was mostly due to the fear of further inflationary tensions. On 16 September – Black Wednesday – the Bank of England started intervening massively on the foreign exchange market in order to prevent the pound from falling below the lower margin of the Deutsche mark (*Idem*, p. 44) – note this was indeed a last resort intervention from a non-dominant currency country. Such intervention was not enough, however. By the end of the day the British authorities announced the temporary suspension of the pound from the ERM, which actually became a permanent withdrawal from the mechanism.

Against this background, it can be said that the EMU (formally launched in 1993 after the approval of the Maastricht Treaty), with its three main ingredients – capital mobility, fixed exchange rate, a single monetary policy (and a single currency) – was a radical solution for the 'impossible trinity'. Simultaneously, it relied on two beliefs, one proved to be correct, while the other not so. The first belief was that the option for an irrevocable peg of the (previously existent) currencies both to each other on a bilateral basis and to the euro would finally prevent speculative attacks upon weaker currencies, thereby overcoming the usual gridlock attributed to fixed exchange rate regimes (as the EMU's predecessor - the EMS - had also shown). This proved to be correct as subsequent speculative attacks were indeed impaired.

The second belief was that the creation of the EMU would eliminate all BoP problems within the area, because the introduction of a single currency would suppress exchange rate risks and, most of all, because a single monetary policy was expected to be a 'common ground' receiving the same seeds for macroeconomic management both internally and externally, including the seeds for competitiveness among EMU member states. Moreover, the EMU intended to overcome the asymmetry found in the previous EMS, where, as seen before, the effort of macro adjustment externally was mostly assigned to non-dominant currency economies, including through foreign exchange reserves management – like emerging economies when pegging their currencies to a leading/stable country usually do – in order to prevent a BoP crisis, ultimately capital outflows. But this belief has not proved to be so for sure, differences in external positions between EMU countries are in the first place a reflection of differentiated economic structures and levels of competitiveness. However, the fact is that the euro, as a single currency, not only did not prevent macroeconomic imbalances to arise but also to a large extent it

is deemed to have amplified them.

Indeed, the euro suffers from misalignments, both internal through the interest rate and external through its exchange rate (Stiglitz 2016). The external misalignment is indeed attributed to the euro's exchange rate, a value considered too low for some countries (in comparison to previous national currencies – e.g. the Deutsche Mark), fostering competitiveness, while it “was too high in several (other) countries, so that their imports systematically exceeded exports” (Stiglitz 2016, p. 261). As a consequence, this gave rise, in those countries, to a trade imbalance financed mostly through rising external debt. The euro has indeed created a new kind of debt - apparently a domestic debt as issued in euros and yet this is in reality an external debt, simply because debtor countries have no individual control over the euro (see also Stiglitz 2016, 265). De Grauwe (2011) in turn explained that when entering a monetary union, member countries cease to have control over the currency in which their debt is issued. In a severe crisis, weaker countries can be subject to default by financial markets; they are therefore “downgraded to the status of emerging economies.” (De Grauwe 2011). In short, the belief that the euro would eliminate BoP problems of its member countries was shown to be wrong. As a consequence, the distinction between dominant and non-dominant currencies in the system, while formally abandoned, remains present.

This external misalignment of the euro is an expression of the EMU's incomplete sovereignty. The EMU is indeed a territory with a single monetary policy, centralized in an (apparent) sovereign fashion at the European level, yet diminished by the retained sovereignties within its member states: EMU member states are in fact the sovereign accounting entities for BoP purposes, they are the allocation centres for exports and imports, the centres of trade flows and payments, and of financial flows; ultimately they are the legal and accounting centres of financial assets and liabilities, and the public and private debt (credit) they owe (own) vis-à-vis other member countries is definitely external debt (credit).

In the next section, I will provide precise details of the two main dimensions, external and internal, of the E(M)U's incomplete sovereignty, the caveats affecting the scope of the single monetary policy (and respective implications), what I describe as a ‘monetary policy integration trap’- i) Externally, the caveat is mainly due to the subsistence and polarization of external (BoP) positions, reflecting in turn the outstanding structural divergence between Member States (exhibiting a ‘core-periphery’ pattern); ii) Internally, the caveat is mostly related to the E(M)U's curtailed fiscal sovereignty and the atypical interaction between this policy and the abovementioned monetary policy, explaining the troublesome risk-sharing effect resulting from such interaction.

2. The Two Dimensions of Incomplete Sovereignty and the Monetary Policy Integration Trap

2.1. A Single Monetary Policy in A Landscape of Remaining National Balance of Payments: The Euro Misalignment and Its Short-Term and Structural Expressions

2.1.1 The Polarization of External Positions and Financial Flows; The Long-Lasting Financial Fragmentation in the European Monetary Union

In the first place, it should be noted that in typical currency unions (e.g. the United States of America, US), problems of BoP between its states (e.g. California vis-à-vis Mississippi) are not even considered: trade imbalances between these states can be recorded, respective financial flows are known, but this is not ‘the’ issue. The issue is the BoP of the US vis-à-vis the rest of the world. In the EMU, on the contrary, the single monetary policy operates in a landscape of remaining national BoP, recording trade relationships between EMU member countries and mutual financial flows.

The financial account is indeed the mirror of the current (trade) account. The single monetary union has avoided the polarization of neither external positions nor financial flows (Milesi-Ferreti and Tille 2011). In particular, the fragmentation of capital markets in the EMU is a reflection of different ‘economic fundamentals’ such as the competitiveness capacity and it is a reflection of macroeconomic divergence across Europe. Lane (2006), while recognizing that the EMU had fostered financial integration in the area and had increased the so-called ‘euro bias’ in different segments of financial

markets, also highlighted that this integration had not been the same for all EMU countries. As a sign of this bipolar financial integration, Lane (2006, p. 54) focused precisely on the increasingly larger current account deficits in the poorer countries of the EMU (Greece, Portugal and Spain) since the enactment of the monetary union.

It should be recalled, in particular, that the 2010 sovereign debt crisis was mostly a 'sudden stop' crisis in capital flows vis-à-vis the peripheral countries (Baldwin *et al.* 2015), very similar to BoP crises, which economists had considered the unthinkable for the euro area (Bénassy-Quéré and Wolff 2020). During the early 'good years' of the euro, large capital flows from Euro area core countries to peripheral countries were viewed as real convergence dynamics, thus hindering the imbalances that were being created (Baldwin *et al.* 2015).

2.1.2 External Polarization at the EMU and Its Structural Expressions

In fact, such imbalances in external positions between EMU countries - that the sovereign-debt crisis thus exhibited – reflect in turn differentiated economic structures and levels of competitiveness. Although the European cohesion policy has attempted to resolve some of this divergence among EU countries, it has not been entirely successful. As noted by the European Commission, EC (2022), the economic convergence of regions over the period 2011-2019 was mainly driven by the catching-up of many of the less developed ones. But this picture is different across EU regions. So, while there has been significant catching-up in eastern Europe, "many less developed regions in Southern Europe have experienced sluggish or negative growth and their GDP per head is diverging away from the EU average" (*Idem*, pp. 24-25). One justification for this different pattern is related to so-called 'development traps' (EC 2022, 35-36): growth is usually higher when initial GDP per head is lower. The low growth verified in middle category regions (in terms of GDP per head), as are some of those southern regions, may be due to this development trap – these regions are indeed characterised by the low cost of capital and labour and by being less innovative or productive than more developed regions (EC 2022, 36).

In this regard, Kapeller *et al.* (2019) refer to the idea of 'economic polarization', while Gräbner *et al.* (2019) use the expression 'structural polarization' to analyse macroeconomic divergence in the E(M)U notably after the creation of the euro. In the former, the authors (Kapeller *et al.* 2019) describe a process of multi-dimensional polarization of EU countries, linking the existing economic divergences with differences in the institutional and legal embedding (*e.g.* tax, labour market) and in technological capabilities. This polarization is due largely to the global and the European 'race for the best location'. In the latter, the authors (Gräbner *et al.* 2019) find evidence for a 'core-periphery' pattern among Eurozone countries; specifically, the emergence of export-driven growth in core countries and debt-driven growth in the Eurozone periphery can be traced back to differences in technological capabilities and firm performance.

The theoretical insights of this approach date back to the New Economic Geography theory, NEG, developed by Krugman (1991). According to this view, trade integration, pushed by economies of scale and other centripetal factors, leads to regional concentration of industrial activities whereby sector-specific shocks may turn into country-specific shocks (see also Puga and Venales 1996). Ascani *et al.* (2002) highlight that the main contribution of the NEG – a 'core-periphery' model - is precisely to evaluate the effects of economic integration on spatial development. In an environment of increasing returns and economies of scale, product differentiation and monopolistic competition, labour mobility and with intermediate transport costs, dispersion forces prevail in the case of negative externalities, driven by congestion or immobility of certain factors of production (*e.g.* land and certain types of labour), whereas agglomeration forces prevail in the case of positive externalities, such as price/wage externalities. In the case of Europe, where labour mobility is constrained, agglomeration effects vis-à-vis core regions are mostly explained by the so-called vertical linkages within a sector or industry (Ascani *et al.* 2002, 10), thereby fostering a process of economic divergence between those core regions and peripheral ones.

Overcoming such economic divergence has proven to be hard in the E(M)U, not only given the nature of this 'core-periphery' economic pattern and the aforementioned development traps, but mostly because unlike that which happens in currency unions with complete sovereignty (the US) where those structural divergences between core/rich vs. peripheral/poor regions give rise to internal imbalances to be solved through internal macroeconomic management tools, in the EMU such imbalances paradoxically remain as external imbalances and therefore are much more troublesome to address.

2.1.3. Some Implications of the Incomplete Sovereignty in the External Dimension: TARGET 2 and Remaining Asymmetries in External Adjustment

The subsistence and polarization of external (BoP) positions in the EMU lead in turn to several implications. Let me highlight two of the most important: *i)* firstly, the specific design and role of the European payment system – the TARGET 2; *ii)* secondly, the remaining asymmetries in external adjustment.

As for the first implication – the role of the TARGET 2 – although the parallel that has been made between this system and similar payment systems in other currency unions, the most usual being the comparison with the US Inter-district Settlement Account (ISA), the fact is that important differences remain, and such differences become more visible in times of crisis. Firstly, it should be noted that the Eurosystem is characterized by a high degree of decentralization in favour of National Central Banks (NCBs): they are the recipient of both seigniorage revenues and dividends related to the implementation of the (single) monetary policy, e.g. the so-called 'quantitative easing' (Gros 2016).

When considering in particular payment systems, it should be highlighted that they typically involve relationships between three layers – the National Central Bank, the intermediate central banks and commercial banks. The role of the central banks (on one hand, national/district banks, on the other hand the top level central bank) is crucial to understanding the nature, whether more centralized or decentralized, of the payment system itself. Bijlsma and Lukkezen (2012) compare the role of Federal Reserve Boards, FRBs, within the ISA with the role of NCBs in the EMU's payment system, TARGET 2. One common idea is that FRBs are owned by other banks (private equity), and this is a strong argument in favour of the decentralized nature of system management. However, Bijlsma and Lukkezen (2012) dispute such an alleged (high) decentralized nature of the ISA showing that the FRBs are effectively owned by the federal government.

In abnormal times of crisis, the differences between these two payments systems become more visible. In Sinn's (2012) opinion, TARGET 2 was a vehicle and an exhibitor of growing external imbalances within the euro area (two coexisting euros, a 'strong' vs. a 'weak' euro). Sinn (2012) qualified TARGET 2 as Target credit, through which peripheral countries 'forced' other Eurosystem countries – with Germany at the head – to provide this credit. The Bundesbank was therefore lending its money printing process to the EMU periphery (Sinn 2012). Schelkle (2017, p. 295), although mentioning the insurance role played by TARGET 2 during the crisis, also acknowledges that that protection function did not neutralize the effects of capital flight. Such flight happened, in part, because, as appropriately noted by Buiters and Rahbari (2012), TARGET balances play the role of foreign exchange reserves: current account deficits can be financed by a capital import from TARGET and current account surpluses can continue because TARGET provides the capital export. Ultimately, this happens because TARGET 2 operates in a landscape with remaining national Balance of Payments thereby impairing the full risk-sharing capacity of the payment system itself. The US payment system (ISA), on the contrary, operates in a single currency territory whose only external account is the account of the sovereign (the US) vis-à-vis the rest of the world. One important consequence is that the Fed is obliged by law to clear all cheques at par to maintain the integrity of the payments system (Schelkle 2017, 284). In contrast, Rossi (2017, p. 38) highlights TARGET 2 'structural imbalances' to explain how it lacks a final payment aspect between the NCBs so involved. This is so, because the ECB does not act as a

settlement institution for the participating NCBs, contrary to the logic of money emission and the orderly working of any payment infrastructure (Rossi 2017, 37).³

The second implication of this incomplete sovereignty in the external dimension relates to the asymmetry for external adjustment. Indeed, unlike that which was expected with the creation of EMU, this asymmetry (identified during the functioning of the EMS) was not overcome with the monetary union. The response to the sovereign-debt crisis – as a BoP crisis – marked that asymmetry. Given the impossibility to use nominal exchange rate depreciation as a short-term tool to address such external imbalance, the adjustment effort, mostly borne by highly indebted countries in the EMU, relied on so-called internal devaluation (through prices and wages). The very notion of ‘austerity’ as popularized by Blyth (2013, p. 2) – “a form of voluntary deflation in which the economy adjusts through the reduction of wages, prices, and public spending to restore competitiveness, which is (supposedly) best achieved by cutting the state’s budget, debts, and deficits” – pointed to that asymmetry in the adjustment effort. In the austerity momentum, surplus countries were not symmetrically engaged in the process of adjustment – e.g. they were spared having to inflate their internal demand in order to foster imports of goods and services from peripheral countries at the cost of reducing the respective external surplus.

As we will see, despite the attempt to overcome this asymmetry with the creation of the so-called Macroeconomic Imbalance Procedure, the response has not so far been sufficient

2.2. The Internal Dimension of Incomplete Sovereignty: Main Implications

Within the internal dimension, one can also find caveats of the incomplete status of sovereignty at the E(M)U level, and the respective implications. As noted by Cabral (2021b, 2021c), E(M)U member states (MS) retain full sovereignty in the tax and borrowing domains: firstly, they are still the prevalent tax assignment beneficiaries of the most important taxes (including typical redistributive and macro stabilizing taxes, e.g. redistributive income taxes), also maintaining full tax powers, as they are the primary (constitutional) decision makers for tax creation and settling tax incidence and tax rates (with minor exceptions for customs taxes and for a certain degree of harmonization at the EU central level involving the general consumption tax); secondly, they have preserved full sovereignty in the borrowing/debt issuance domain, and are the location of the sovereign Treasury function. Hence, the allocation centre of the (so-called) sovereign debt for the E(M)U is neither the EU nor the EMU on their own (as accounting and legal centres for the allocation of liabilities).⁴ Sovereign debt is still the national Member States’ debt.

2.2.1. The Intermediate Nature of the EU Budget

One important caveat of the incomplete sovereignty in the tax and borrowing field is the anomalous design of the EU budget itself. In comparison to other central budgets (either of unitary or federal governments), the EU budget exhibits these three peculiar features:

i) Its historically small dimension

Unlike that which happens in most OECD countries (unitary or federal countries), the EU budget is not capable of ensuring a macroeconomic stabilization function since it is too small in comparison with national budgets (Begg 2012). This characteristic of the EU budget, since its inception, has not seen much change from its initial (related to the EU’s GDP) to its current dimension. Hence, as pointed out by

³ Within each country’s Real-Time Gross Settlement (RTGS), the national central bank is a necessary institution that issues the means of final payment that banks need to settle their debts during or at the end of any banking day. By contrast, between any two euro-area countries, to date, payments are not final for the countries concerned, as they leave the ‘receiving’ country with a claim on the set of TARGET2 participating countries (Rossi, 2017, p. 37).

⁴ However, COVID-19 crisis management has opened the “Pandora box” of centralization of competences in the borrowing field, as a way to finance the new Recovery and Resilience Facility (RRF) with the EC being assigned (on behalf of the EU) with the power to issue debt (bonds and short term securities) on capital markets. The repayment of such debt is to be ensured through new EU Own Resources, which can ultimately be seen as a path for future EU tax sovereignty. As noted by Schelkle (2021), the RRF gave the Commission the power to tax for the first time.

De Grauwe (2014, p. 8), the EU's budget amounts to only 1% of EU GDP (now temporarily doubled with the RRF) while national budgets typically absorb 40% - 50% of GDP.

ii) The pattern of respective taxes and expenditures is not sensitive to cyclical fluctuations

Begg (2012) explains that in most mature economies, the federal or central government performs this crucial role, partly through the action of automatic stabilizers which arise through the interaction of public expenditure and taxation – tending to offset any fall in demand – and partly through discretionary changes in public expenditures or tax rates. The simple existence of a central budget allows for stabilization mechanisms to operate whenever adverse shocks occur. In the case of the EU budget, on the contrary, the type of tax-based resources and expenditures are not designed to pursue interindividual redistributive functions and through that to pursue any kind of stabilizer goal.

iii) The intermediate nature of the EU budget

The relationship of the EU budget is not established directly with European citizens, as it is always a relationship mediated by the MS. On the revenue side, EU own resources are actually transfers from the MS to the European budget, according to a system of allocation based on a call rate. Therefore, EU own resources are not true tax revenues – and they are not even described as such - levied directly on individual tax payers (either persons or corporations), with the exception of the so-called 'traditional own resources' levied on an identifiable taxable operation. As noted in this regard by Cipriani (2014, p. 7), the concept of 'own resources' should have meant a shift of sovereignty from member states to the EU institutions, allowing the EU to exert direct power of taxation over EU citizens. Ultimately, a tax directly borne by EU citizens should not even be registered in national MS budgets. However, this was not the case: as witnessed, most MS still describe their own contribution as a transfer to the EU budget. In turn, on the expenditure side, EU expenditures are mostly earmarked grants paid by the EU budget to MS (transfers to their national budgets). Therefore, with small exceptions (e.g. EU personnel expenses) there are no direct expenses paid to European citizens by the EU budget, as typically found in other central budgets (e.g. unemployment benefits and other social benefits). In short, the EU budget – unlike state budgets – is not a 'citizen budget', and thereby lacks this democratic ingredient, which is ultimately a source of sovereign legitimacy.

2.2.2. The Atypical Interaction Between Fiscal and Monetary Policies and the Limited Risk-Sharing Effect in the Debt Market

Quantitative easing, QE, was materialized in the EMU through the Asset Purchase Programme launched in the aftermath of the sovereign-debt crisis (2013 onwards) and the Pandemic Emergency Asset Programme implemented in 2020 after the COVID-19 implosion. QE has shown new interactions between monetary and fiscal policies, given the mutually positive externalities verified – in the same way such expansionary monetary policy has created space for fiscal policy by reducing borrowing costs, fiscal policy has created space for monetary policy, providing a fiscal backstop and therefore internalizing the risks and costs of an ultra-low interest rate environment (Bartsch *et al.* 2020, 56). In particular, this backstop protected the central bank from having to run with thin or negative capital in the event it incurred large portfolio losses from its monetary operations; such insurance thus preserved the central bank's independence and credibility by enabling the significant risk-taking inherent to unconventional monetary operations (Bartsch *et al.* 2020, 55). However, if this was (is) true, it should also be highlighted that such risk-sharing tended (tends) to be constrained since such a fiscal backstop provided to NCBs has mostly been given by national fiscal authorities of each of the MS and not by a single Treasury of the Union, as one would expect to find in a centralized monetary policy (Cabral 2021c). Debt purchased by the ECB is still the debt of MS (still the sovereigns in the borrowing domain) and not the debt of the central government, which is the E(M)U itself. Therefore, unlike that found in currency unions with complete fiscal sovereignty (both in tax and borrowing areas) the mutually positive externalities in the interaction between monetary and fiscal policies are not fully-fledged and the risk-sharing effect is necessarily more limited.

In particular, given the highly decentralized structure of the Eurosystem, just as NCBs can benefit from the implementation of QE with dividends, they can incur losses related to monetary operations. QE has meant a significant increase in the ECB's balance sheet, but it has mostly meant an increase in NCB balance sheets. The occurrence of losses, the risk of which may have been amplified by QE itself, can affect the Eurosystem's profitability and ultimately the ECB's and NCBs' capital. This outcome can be problematic in the event of (abrupt) normalization of monetary policy - a 'natural' modification given the recent developments in inflation caused by the increase in energy and commodity prices in the course of post-lockdown recovery and now amplified by the war in Ukraine. To sum up, in the presence of this new inflation-driven shock, besides the likely increase in the spreads of peripheral country 10-year bonds vis-à-vis Germany's sovereign bonds (that is, again, a national bias in the debt market), one should add the increase of balance-sheet risks and costs suffered by the respective NCBs.

3. The State-Mimicking Method as a Way to Address the European Monetary Integration Trap

In the absence of a State with complete sovereignty, the E(M)U has developed, especially after the sovereign-debt and COVID-19 crises, a policy-oriented approach or method that I describe as a 'State-mimicking' method. This is a heterodox, and yet pragmatic approach to overcoming the integration trap, that is, all the caveats found both in the external and internal dimensions in the implementation of the single monetary policy and caused by the status of E(M)U's incomplete sovereignty.

A notable feature of such an approach is that it relies on two attempts both on the external and internal fronts: *i*) on the external front, the attempt to bypass remaining national BoP and fragmented financial markets, using proxies of a non-differentiated territory (a 'metaverse?'), 'as if' it was real; *ii*) on the internal front, the attempt to mimic budgetary instruments of the sovereign State, although not using conventional tools but instead innovative budgetary prototypes.

3.1. The State-Mimicking Method in the External Dimension of Incomplete Sovereignty: Two Examples and Their Respective Shortcomings

Bypassing remaining national BoP and financial fragmentation involves some sort of creativity, attempting to overcome the single monetary policy caveats, in particular, as seen above, the external misalignment of the euro and the related subsistence of polarization of external positions and capital flows within the currency union. My point is precisely that - such BoP positions remain 'external'; they have not become 'internal' as would have happened were the EMU to be a true political union with complete sovereignty.

The first example of such a heterodox attempt relies on the so-called Macroeconomic Imbalance Procedure (MIP), a procedure created in the aftermath of the sovereign debt crisis,⁵ aiming to reinforce the functioning of the European internal market, fostering its optimality conditions, *e.g.* flexibility of prices and wages and mobility of factors (see Bénassy-Quéré 2015). Differences in the functioning of the internal market can occur even in currency unions with complete sovereignty – *e.g.* regulatory regional differences (*e.g.* labour legislation), tax competition, barriers to factor mobility of several kinds. Macroeconomic imbalances of an internal nature (*e.g.* regional shocks differently affecting unemployment rates) can also take place. What does not happen within those (complete) currency unions is macroeconomic imbalances of an external nature, that is, different regional BoP positions. The MIP attempts to bypass these outstanding differences by including, in the excessive imbalances procedure, adjustment measures both for countries with excessive external deficits and surpluses. Imposing corrective measures for both types of imbalances implies, to a certain extent, the idea of a mirror, as if offsetting measures to correct excessive deficits with measures to correct excessive surpluses would actually lead us to a territory without different external positions. However, this is not the EMU's real world, it is just a tentative yet imperfect proxy of having a 'single BoP' within the EMU.

⁵ Regulation (EU) No. 1174/2011 of the European Parliament and of the Council of 16 November 2011 on the reinforcement measures to correct excessive macroeconomic imbalances in the euro area.

Moreover, in the case of the MIP, the adjustment effort is not symmetric: an external deficit above 4% regarding (the national) GDP is considered excessive, whereas in the case of surpluses they will be considered excessive if above 6% regarding GDP. In short, not only were remaining national BoP not overcome with the EMU, but also it was not capable of fully eliminating the implicit distinction between different currencies, the dominant and the non-dominant, where the adjustment effort is still mostly borne by the latter (despite a *de jure* single currency).

The second example – which is even more disturbing from this point of view – relies on the launching, also after the sovereign debt crisis, of the Capital Markets Union, the CMU (formally adopted in 2015 with the establishment of the *CMU Action Plan*). The main purpose of the CMU was also to ensure a better functioning of the internal market and so to reinforce private risk sharing mechanisms through stock and bond markets. In particular, the CMU was conceived to overcome financial fragmentation within the EMU and, indirectly, to ensure a more uniform transmission mechanism of monetary policy. However, although inspired by the US model (as a typical example of full capital market integration), the European CMU entails a plausible oxymoron, since – due precisely to remaining national external positions and financial flows – it cannot aim to be a single *indistinct* (national) flow of capital as it is, by nature, in the US. At most, the CMU will be a creative proxy of the envisaged (US) model, however imperfect and incapable of resolving the prior existential contradiction – e.g. national biases in capital markets - on which it relies.

3.2. Fiscal Capacity and Debt Mutualization Instruments as State-Mimicking Responses for the Non-Existent Fiscal Union: Virtuality and Limitations

Furthermore, in the internal dimension (fiscal/budgetary policy front), the proposals made after sovereign-debt and COVID-19 crises were (are) marked by an attempt to mimic a fiscal union, in the absence of it (Cabral, 2021c).

The first example was/is the proposal to create ‘fiscal capacity’ in the E(M)U. Given the lack of a central budget fulfilling a stabilizing role, this fiscal capacity, a sort of ‘micro-budget’, would work as an insurance device or a risk-sharing mechanism aiming to respond to asymmetric shocks (Cabral 2021c). The fiscal capacity could be materialized under two main approaches: on the one hand, the anti-cyclical approach (e.g. proposals for the European Unemployment Benefit Scheme⁶ and anti-cyclical funds⁷); on the other hand, the convergence-based approach (Cabral 2021a) – the idea was to use EU (structural) funds, typically made for convergence purposes, to also carry out discretionary expenditure with some kind of stabilizing role, notably in areas with higher multiplier effects, e.g. investments in social housing and renewable energy. This latter approach was eventually accepted in certain programmes launched at that time, as was the case with the ‘Juncker Plan’ launched in 2015 and, more clearly, the ‘Budgetary Instrument for Convergence and Competitiveness’ proposal, in 2019, intending to use discretionary expenditure (e.g. specific investment) as a macro-stabilizer in the advent of adverse shocks.

The second example of these mimic-type instruments were the proposals for creating debt-pooling instruments (the so-called Eurobonds⁸, followed by the Coronabonds proposal) and of new debt securitization instruments.⁹ None of these instruments were intended to be confused with an actual Treasury, where debt issuance is made ‘in the name and on behalf’ of that sovereign central state thereby combining tax autonomy with full borrowing capacity. However, in terms of mimicking a Treasury, the peculiarity of such instruments should be acknowledged as they somehow intended to do more than Treasury bonds have actually been created to do (Cabral 2021c). In fact, these new debt instruments to be created at the E(M)U level were assumed to have a specific purpose, which was to solve or prevent a debt crisis of member states, still considered ‘the’ fiscal sovereigns.

⁶ See European Commission (2017).

⁷ For example, more recently, Beetsma and Kopits (2020).

⁸ De Grauwe and Moesen (2009).

⁹ Brunnermeier *et al.* (2012).

Lastly, it can be said that the proposed design for these instruments is heterodox as a way to circumvent the E(M)U's incomplete sovereignty on the fiscal front, as well as in the sense that they do not correspond to conventional budgetary instruments (e.g. a budget, taxes, central borrowing instruments, a Treasury), but rather - as described - to innovative budgetary prototypes (e.g. 'fiscal capacity'; debt pooling instruments; public debt securitization).

Conclusion

The 'State-mimicking' method, here described as a heterodox and unique method made to address the two dimensions of incomplete sovereignty both on the internal and external fronts, appears to so far be the possible (pragmatic) macroeconomic policy solution to bypass the monetary policy integration trap. This can be seen, in turn, as a recent expression of the heterodox nature of the EU institutional and governance architecture and of the atypical nature of the entity itself, permanently swinging between centrifugal and centripetal forces. The EU is the product of a singular combination of intergovernmental, domestic, (neo)functionalist and 'expertocratic' approaches (see Heipertz and Verdun 2010). Interestingly, this 'novel hybrid' (McNamara 2015) has been marked over the years by peculiar and pragmatic-driven institutional and legal features, able to forge new solutions for crises or disruptions, such as for example: *i)* the supranational delegation of powers not only in conventional EU institutions but in new atypical ones, that is, formal and informal EU institutions or bodies not within the conventional spectrum – e.g. the Eurogroup (see Lindseth, 2014); *ii)* an exotic legal system juxtaposing with EU law new sources of non-EU law, and eventually merging with the former – e.g. the legal provision of the European Stability Mechanism (see, in this regard, Bardutzky and Fahey, 2014). The State-mimicking method, while not solving the prior existential contradiction on which the E(M)U relies (it is not meant to do so) is indeed the ultimate expression of such a pragmatic and heterodox approach.

On the other hand, the RRF – the new financial package launched in the EU to tackle the economic effects of the COVID-19 pandemic – has assigned the EC with a new borrowing capacity as a way to finance EU expenditures to be eventually backed up by new tax own resources. In turn, more recently, the possible EC new competences to address the effects of the war in Ukraine – e.g. Energy, Defence – will most likely justify the issuance of new European bonds and other forms of European debt. These two recent developments seem to have transformed the EC into a new centre of sovereignty on the fiscal/budgetary front, with respect to borrowing and tax competences. As a consequence, a more complete match between monetary and fiscal European sovereignties can be anticipated and so a new type of interaction between these two policies. Eventually, the debt purchased by the ECB under a future form of QE could now be 'true' European denominated-debt, allowing for the full mutual backstop between these two policies as usually seen in a state with complete sovereignty. However, these steps ahead must be cautiously interpreted: they are probably just another expression of heterodox *realpolitik*. Last May, Italy's Prime Minister Mario Draghi urged the EU to embrace a "pragmatic federalism" that would include ditching national vetoes and treaty change.¹⁰ In my view, this statement translates the political will to increment this realistic policy approach marked by institutional/legal disruption, of which the analysed 'State-mimicking' method is a good example. This approach, while imperfect, is indeed well-suited to sustain the E(M)U, a quasi-state afraid (unable) to become one.

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INFORMAL SECTOR AND INSTITUTIONS

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Abstract:

In this paper, I investigate the relationship between informal sector size and various institutional quality variables: government stability, external conflict, internal conflict, corruption control, military influence over politics, religious tensions, ethnic tensions, law-and-order, democratic quality, and bureaucratic accountability. To this end, I use annual cross-country panel data covering 130 countries from 1990 to 2018. Having conducted a correlation analysis, the size of informal economy and institutional quality indicators are inversely linked. The most crucial institutional quality determinants are law-and-order (-0.53), bureaucratic quality (-0.51), military in politics (-0.45), corruption control (-0.42), and internal conflict (-0.35).

Keywords: informal sector; institutional quality; cross-country analysis; panel data.

JEL Classification: E20; E02.

Introduction

The informal economy can be described as a set of economic activities that take place outside the framework of official institutions. According to ILO, the root causes of informal sectors include elements related to the economic context, the legal, regulatory, and policy frameworks, and some micro-level determinants such as low level of education, discrimination, and lack of access to economic resources. Research in the field proved an improvement in institutional quality leads to a rise in official income in exchange for the shrinkage of the informal economy. Jahan *et al.* (2020) used data from Brazilian municipalities to explore the influence of institutional quality on PCI. It has been found that better institutions are linked with lower rates of informal sectors. In this paper, I explore the statistical correlation between informal sector size and various institutional quality variables: government stability, external conflict, internal conflict, corruption control, military's influence over politics, religious tensions, ethnic tensions, law-and-order, democratic quality, and bureaucratic accountability. Having conducted a correlation analysis, I find that the size of informal economy and institutional quality indicators are inversely linked to each other. The most important institutional quality determinants are law-and-order (-0.53)¹, bureaucratic quality (-0.51), military in politics (-0.45), corruption control (-0.42), and internal conflict (-0.35).

¹ Correlation coefficients are reported in parentheses.

1. Data

Table 1. Descriptive Summary Statistics

| | Mean | Median | Standard Deviation | Minimum | Maximum |
|------------------------|-------|--------|--------------------|---------|---------|
| Informal Sector | 29.38 | 28.04 | 13.03 | 7.97 | 67.66 |
| Gov. Stab. | 7.90 | 7.83 | 1.87 | 1.00 | 12.93 |
| Int. Conf. | 9.14 | 9.46 | 2.06 | 0.00 | 12.00 |
| Ext. Conf. | 10.02 | 10.04 | 1.58 | 0.00 | 12.00 |
| Corr. Cont. | 2.93 | 2.63 | 1.28 | 0.00 | 6.00 |
| Military | 3.89 | 4.00 | 1.75 | 0.00 | 6.00 |
| Relig. Tens. | 4.60 | 5.00 | 1.29 | 0.00 | 6.00 |
| Law&Order | 3.80 | 4.00 | 1.38 | 0.00 | 6.00 |
| Ethn. Tens. | 4.05 | 4.00 | 1.32 | 0.00 | 6.00 |
| Democ. Acc. | 4.00 | 4.00 | 1.60 | 0.00 | 6.00 |
| Bur. Qual. | 2.24 | 2.00 | 1.12 | 0.00 | 4.00 |

Data on Informal sector size is obtained from Elgin (2021). All other institutional quality variables are acquired from the International Country Risk Guide of Political Risk Services Group.

Table 1 presents descriptive summary statistics of all variables used in the empirical analysis.

2. Methodology

I conduct a correlation analysis using annual cross-country panel data covering 130 countries from 1990 to 2018. And my empirical analysis will rest upon two dimensions. In one, I will calculate and report the correlations of each relevant institutional quality variable with informal sector size and visualize those correlations.

As well known, a correlation coefficient is always between -1 and 1. A negative correlation between two variables indicates that the two variables generally move in opposite directions and a positive correlation suggests that they move in the same direction. However, a correlation coefficient that is remarkably close to 0, even though it can be negative or positive, may not be significant. The rule of thumb here is that a positive correlation should be above 0.1 and a negative one should be below -0.1 to be statistically significant.

3. Results

Table 2 presents correlation between informal sector size and all institutional quality variables. Accordingly, the institutional quality variables that have the most statistically significant relationship with informal sector size are law and order, bureaucratic quality, military in politics, corruption control, and internal conflict.

Table 2. Correlations between Informal Sector Size and Institutional Quality Measures

| Variable | Correlation Coefficient |
|---------------------------|-------------------------|
| Government Stability | -0.12639748 |
| Internal Conflict | -0.354381795 |
| External Conflict | -0.172880889 |
| Corruption Control | -0.419004728 |
| Military in Politics | -0.450019974 |
| Religious Tensions | -0.103106149 |
| Law-and-Order | -0.528008733 |
| Ethnic Tensions | -0.206538096 |
| Democratic Accountability | -0.28957589 |
| Bureaucratic Quality | -0.511252561 |

Table 2 presents the correlations between the informal economy and institutional quality indicators: government stability, internal conflict, external conflict, corruption control, military in politics, religious tensions, law-and-order, ethnic tensions, democratic accountability, and bureaucratic quality. Government stability and internal and external conflict institutional quality measures have been graded between 0 and 12, as values closer to 12 have been determined as positive. Similarly, other institutional quality indicators, corruption control, military in politics, religious tensions, law and order, democratic accountability, and bureaucratic quality, have been scored between 0 and 6, and scores illustrate a positive value as they get closer to 6. Table 2 indicates that the size of the informal sector is negatively linked to the institutional quality measures, and the most critical institutional quality indicators have been law-and-order, bureaucratic quality, military in politics, corruption control, and internal conflict.

Figure 1. Informal Sector vs. Government Stability

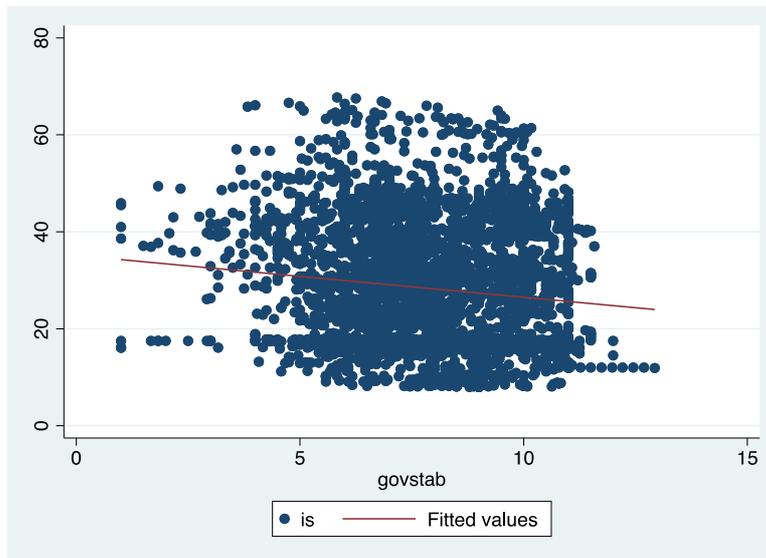
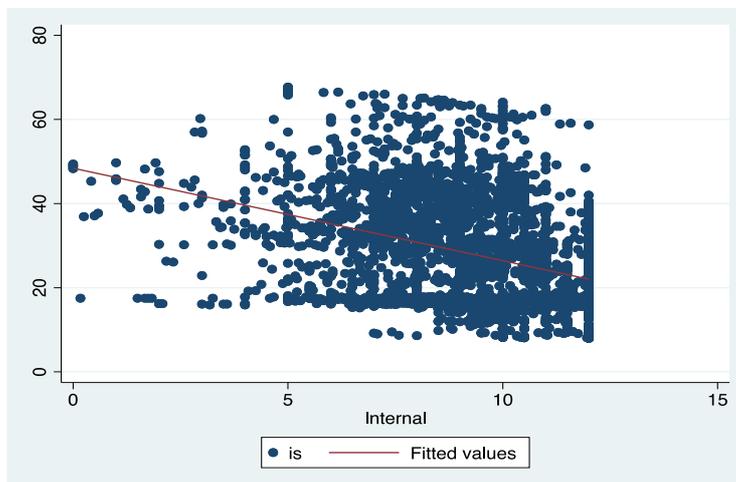


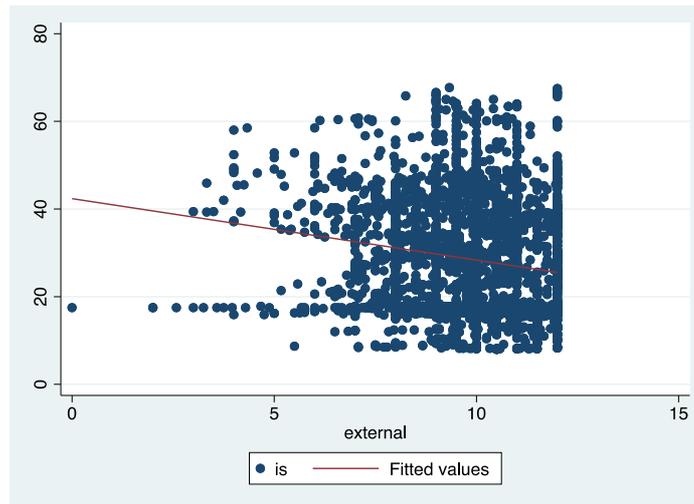
Figure 1 presents a scatter plot diagram where I illustrate the correlation between informal sector size (on the y-axis) and government stability (on the x-axis). Statistics represent the information that government stability and the size of informal economy are not strongly related. The scatter plot implies a weak link between government stability and IS/Y since the data has been spread across the sheet. Furthermore, the correlation coefficient of government stability and shadow economy has been reported to be -0.12.

Figure 2. Informal Sector vs. Internal Conflict



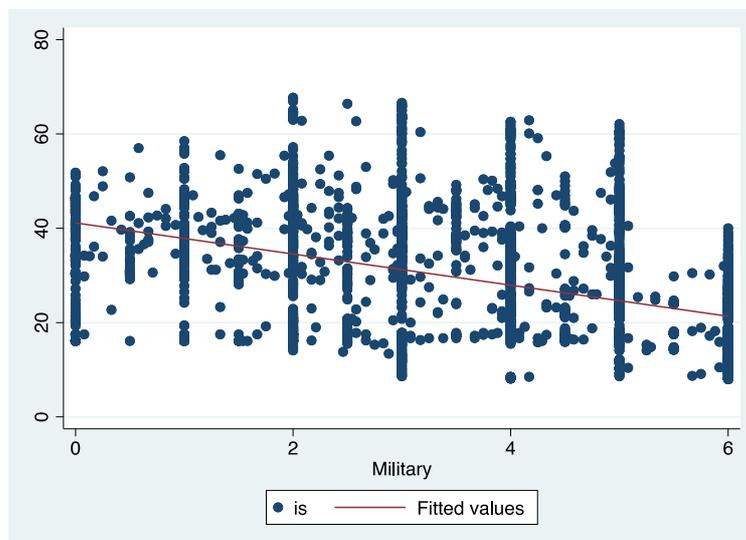
Next, Figure 2 illustrates the association between unseen economy vs. internal conflict. An inverse correlation has been reported between the variable “internal conflict” and the ratio of IS/Y. For example, the countries that have experienced the internal conflict index between 0 and 2 have experienced a higher ratio of shadow economy to gross domestic product, clustered around 40 and 60 percent. It has been reported that the countries that have experienced an internal conflict index close to 12 have a lower proportion of the informal sector. The correlation coefficient is -0.35, which can be considered a respective association.

Figure 3. Informal Sector vs. External Conflict



In the scatter plot in Figure 3, I also illustrate a weak negative correlation between external conflict and IS/Y. It has been reported that the size of the informal sector is not much affected by external conflicts. Almost half of the data is between the index points of 0 and 6, which indicates a higher amount of external conflict coefficient and has IS/Y ratios of 20 percent. In contrast, the countries' IS/Y ratios have been clustered between external conflict index points of 6 and 12. The correlation coefficient of external conflict and IS/Y is -0.17, which indicates a weak negative correlation.

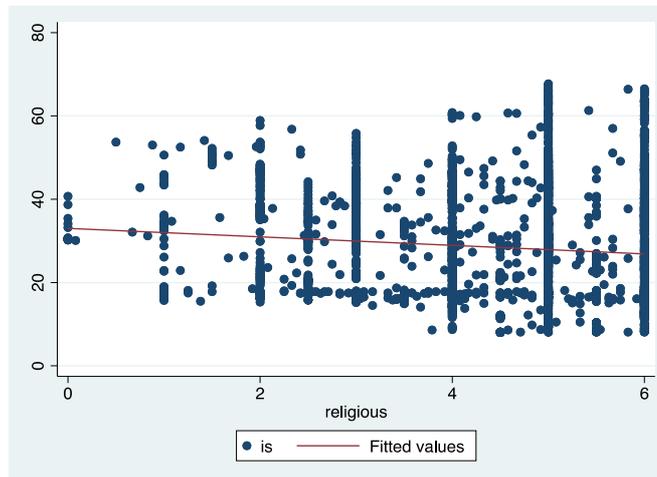
Figure 4. Informal Sector vs. Military in Politics



Moreover, the graph in Figure 4 indicates an inverse relationship between the proportion of the shadow economy to gross domestic product and the military's role in politics. Between the index points

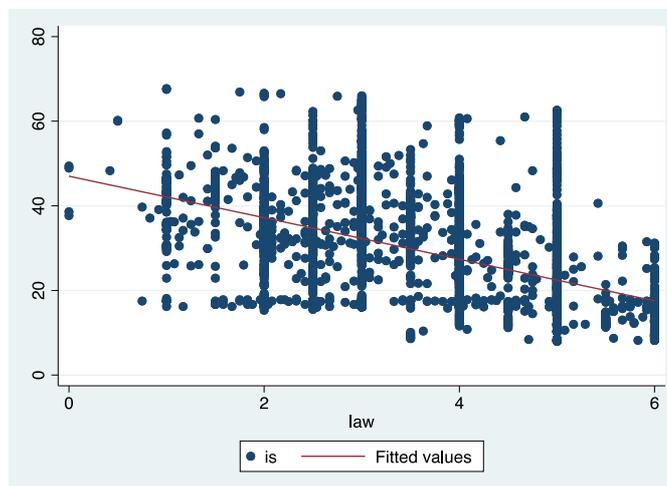
of the military in politics, sections 0 and 3, which illustrate the military's increased role in politics, the IS/Y ratio has reached the highest point of almost 70 percent. In contrast, at the index point of 6, which illustrates the decreased role of the military in politics, the maximum IS/Y ratio has been found to be nearly equal to 40 percent. The correlation coefficient of the role of the military in politics and IS/Y is reported to be -0.45.

Figure 5. Informal Sector vs. Religious Tensions



The indicated scatter plot in Figure 5 represents a weak negative correlation between religious tensions and IS/Y. Higher proportions of IS/Y are clustered at the index points of religious tensions at 5,00 and 6,00, which indicates a significantly lower religious tension coefficient. The correlation coefficient of religious tensions and IS/Y has been -0.1, which has also been the weakest negative link of all independent variables.

Figure 6. Informal Sector vs. Law and Order



In Figure 6, I draw a strong negative correlation between law and order and the informal sector. The ratio of the informal sector to gross domestic product (GDP) tends to decrease as the index of law-and-order increases. When the law-and-order index is close to 6, the IS/Y ratio is reported to be lower than 35 percent; conversely, the proportion of IS/Y is shown to upsurge as the law-and-order index decreases. The IS/Y ratio is clustered around 50 percent between the 1,00 and 4,00 index points of law-and-order. The negative correlation between the law-and-order index and the ratio of IS/Y has been found to be the strongest among the other variables, with a correlation coefficient of -0.53.

Figure 7. Informal Sector vs. Ethnic Tensions

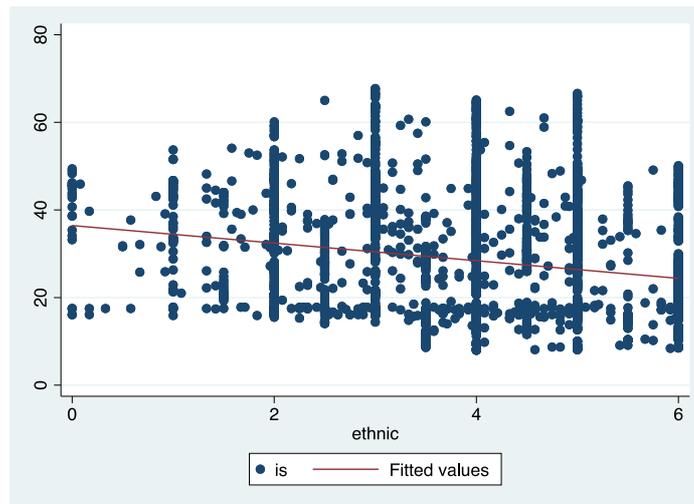
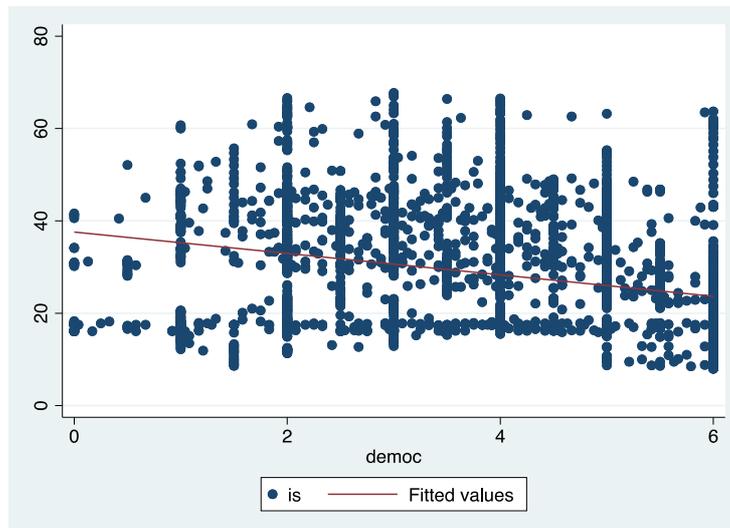


Figure 7 presents the negative correlation between ethnic tensions and IS/Y. The proportions of countries' IS/Y ratios and their index points of ethnic tensions have created a similar pattern. The data between the index points 1 and 6, which indicates high and low ethnic tension coefficient, shows that ethnic tensions and IS/Y have not been strongly negatively correlated since the ranges of the index points' IS/Y ratios have been like each other. The correlation coefficient of ethnic tensions and IS/Y is -0.21.

Figure 8. Informal Sector vs. Democratic Accountability



In the scatter plot above in Figure 8, I present information about the panel analysis between informal sector vs. democratic accountability and the negative correlation between democratic accountability and the ratio of the informal sector to gross domestic product. Countries' index values have been clustered between 15 percent and 50 percent; however, the negative correlation between democratic accountability and the proportion of hidden economy to GDP is weak because the data has not been explicitly classified between different index points of democratic accountability. Moreover, the correlation coefficient of democratic accountability and IS/Y has been -0.29.

Figure 9. Informal Sector vs. Corruption Control

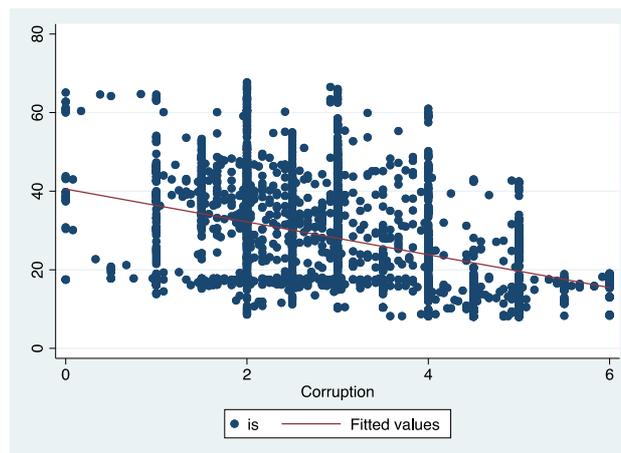


Figure 9 draws the negative correlation between informal economy vs. corruption control. As can be seen from the scatter plot, the existence of an informal economy rarely occurs on the index score of corruption, which has been closer to 6. In countries between the index scores of 4 and 6, the informal economy has occurred by twenty percent. In addition, cross-country panel data has been clustered between the institutional quality index score of 2 and 3. The occurrence data of informal economy has been chiefly recorded between 20 and 50 percent. It has been reported that the correlation coefficient of the informal sector vs. corruption control is -0.42, which has been a strong negative link.

Figure 10. Informal Sector vs. Bureaucratic Quality

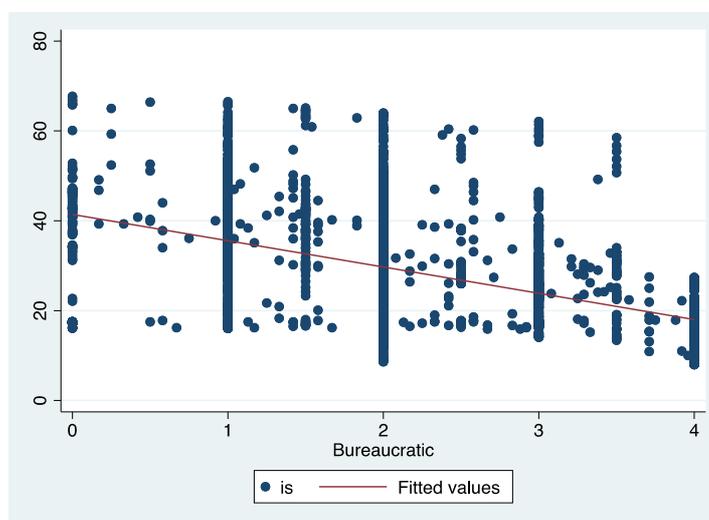


Figure 10 reports the inverse correlation between shadow economy vs. bureaucratic quality. The association coefficient between informal sector vs. bureaucratic quality has been reported as -0.51, one of the strongest negative correlations between institutional quality indicators and hidden economy. This suggests that the higher the bureaucratic quality the smaller the informal sector size across countries.

Conclusion

In this paper, I analyzed the association between the size of the informal economy and various institutional quality variables such as government stability, external conflict, internal conflict, corruption control, military influence over politics, religious and ethnic tensions, law-and-order, democratic quality, and bureaucratic accountability. Henceforth, I have observed that informal sector size and institutional

quality determinants have a negative correlation, and the most significant institutional quality variables have been law and order (-0.53), bureaucratic quality (-0.51), military in politics (-0.45), corruption control (-0.42), and internal conflict (-0.35)

It was my responsibility to suggest possible reasons for the results, speculate on the significance of the results, and suggest what additional research would be worthwhile. The narration of the sample group explores the link between institutional quality variables and the informal economy. To explain in detail, I have found strong negative associations between the size of the informal economy and institutional quality indicators of law and order, bureaucratic quality, the military's influence over politics, corruption control, and internal conflict. In my opinion, indicated indicators' association with the informal economy can be explored in detail by narrowing the sample size and monitoring the political and social events that can influence the size of the unseen sector. Also, further research can increase the sample size and separately examine the results of a possible correlation to analyze the political, social, and economic dynamics.

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GENERALIZED FISHER HYPOTHESIS VALIDITY FOR CANADA, UK, AND SUISSE STOCK MARKETS: EVIDENCE FROM PANEL ARDL MODELS

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Abstract:

In this paper we propose a decision support tool for the investor in terms of asset allocation. The key question is to know whether equities are perfect hedge against inflation if either we invest in only one market or if we go to all the considered markets. We chose three democratic countries having common monetary policy based on the Inflation rate stabilization targeting (including Canada, UK, and Suisse) over the period 1999M01-2018M04. We see how the stock return evolution is related to inflation rate Pre, during, and Post 2008 Global financial crisis (GFC). Then, some dynamic version of the Generalized Fisher hypothesis (GFH) models are explored by some univariate and panel autoregressive dynamic linear (ARDL) frameworks. We conclude that during crisis period, being on either Suisse or Canadian stock market, investors can have important abnormal gains. Then including the UK in a portfolio allows investors to limit losses caused by inflation in the UK stock market alone.

Keywords: GFH; GFC; panel and univariate ARDL models; MG; PMG; Canada; UK; Suisse.

JEL Classification: C23; G00; G14; G15.

Introduction

The original hypothesis that is attributed to the monetarist, Irvin Fisher offers the first preliminary study towards formalizing the relationship between asset returns and inflation. Fisher hypothesis assumes that nominal interest rate is expressed as the sum of real return and inflation rate.² Fisher, (1930) hypothesized that the expected real interest rate is determined by real factors and is *independent* of the *expected inflation rate*. This hypothesis was generalized to asset in the efficient stock markets context (Fama and Schwert 1977).

² Fisher (1930) asserted that the "nominal" interest rate consists of a "real" rate plus the expected inflation rate.

The generalized Fisher hypothesis (GFH) assumes independence between the expected real return and inflation. Invalidation of the GFH, that real returns on *financial assets* are likely to be dependent of inflation rates, has some implications. The more important implication is the uncertainty creation across financial markets, thereby adversely affecting investment and saving decisions in an economy.

The Fisher hypothesis has become the workhorse for motivating the inflation hedging question of any asset class including commodities (Arnold and Auer, 2015). However, existing empirical research on the relationship between stock returns and expected inflation hasn't reached a consensus yet.

The generalized Fisher hypothesis assumes the *independence* between the expected real return and inflation and a *positive* relationship between nominal stock returns and expected inflation. These conditions have been extensively explored for developing and advanced economies over the past three decades (Lintner 1973; Fama 1981; Geske and Roll 1983; Basse and Reddemann 2011; Arnold and Auer 2015; Baker and Jabbouri 2016; Baker and Jabbouri 2017; Adekoya, *et al.* 2021; and Sangyup and Junhyeok 2022). Some studies highlighted the existence of *positive and/or negative* associations (Hardin, *et al.* 2012; Hoesli, *et al.* 1997; Barnes, *et al.* 1999; Lee and Lee 2012), while others have detected *only a negative* relationship (Chatrath 1997 and Maysami and Koh 2000).

Two other important questions on the correlation between real stock returns and inflation rates are treated in the literature. The first is about the sign and the strength of the correlation that may depend on the frequency scale (price level vs index level). The second is about how the correlations can evolve heterogeneously overtime (Valcarcel 2012 and Antonakakis, *et al.* 2017).

Previous studies have dealt with different models and inferential (estimation and test) approaches in order to detect and explain the hedging inflation ability. Recently, for *robustness question*, the panel data-based approach was used in a few number of papers (Afees, *et al.* 2020; Afees, *et al.* 2019; and Halit 2016). For example, Afees *et al.* (2019) found that the GFH test results based on panel data (the price level data for the individual constituents of US stock returns) were opposite to those based rather on the index level data (univariate time series).

In this paper, GFH test will be verified within the Panel type data. We consider three developed countries having in common a monetary policy based on inflation rate targeting stabilization including Canada, the UK, and Suisse stock markets for the period from 1999M01 to 2018M04 covering 2008 GF crisis. The objective is to examine the inflation-hedging ability within each stock market and within the panel data of the considered three markets. We want to know if hedging ability results from each stock markets may be different from ones of the portfolio asset from the three stock markets. In addition, since the long run relationship between stock return and inflation can be instable through time, the analysis will be done for the following four periods: the full data set and the three sub periods: Pre the Global Financial Crisis (GFC), during the GFC period, and Post the GFC period. To the best of our knowledge, our paper is the first which uses a univariate and panel ARDL approaches to explore the GFH relationship that examining the inflation-hedging ability.

This study is organized as follows. After introduction, we give an empirical literature review. We mention then the required data and their sources and we give some descriptive analysis and present data analysis. After that, we outline the methodology used and we provide the empirical results and discussion. Concluding remarks will be given at the end.

1. Literature Review

During the 1970s, new evidence contradicted the economic GFH. More specifically, (Nelson 1976; Bodie 1976; Fama and Schwert 1977; and Modigliani and Cohn, 1979) reported a negative relationship between stock returns and inflation. Later, from the consequence of proxy hypothesis effects, Fama (1981) concluded also for the negative correlation between stock returns and inflation.

This proxy hypothesis garnered substantial support in some subsequent papers (Gultekin 1983; Geske and Roll 1983; and Erb *et al.* 1995).

The negative relationship between real stock returns and inflation rates has also been explained by four theories based on four hypotheses including Money Illusion Hypothesis (MIH), Tax Effect Hypothesis (TEH), Proxy Effect Hypothesis (PEH), and Reverse Causality Hypothesis (RCH) (Tiwari, *et al.* 2019).

The positive relationship between nominal stock returns and inflation rates was also explained by the Wealth Effect Hypothesis (WEH) since real stock returns can effect inflation rates through their impact on consumption and then on aggregate demand (Ando and Modigliani 1963). According to WEH, there are different channels through which stock prices can affect consumption such as the realized gain (higher future income and wealth) via the expectation that raising the current stock price, the liquidity constraint effect, and the stock option value effect. Based on these two hypotheses [GFH and WEH], a positive relationship between nominal stock returns and inflation rates can be observed in the data.

Empirically, the relationship between (nominal or real) stock returns and inflation has been analyzed in the literature for *short or long horizons*. For *short-run*, many have found a negative correlation (Bodie 1976; Fama and Schwert 1977; Fama 1981; Ghazali and Ramlee 2003; Koustas and Lamarche 2010; and Tsong and Lee 2013), while for *long-run*, the results are more likely to support the Fisher hypothesis (Schotman and Schweitzer 2000 and Lothian and McCarthy 2001).

More recent studies are based on recent models and techniques in order to detect the hedging inflation ability such as the NARDL model (Thi, *et al.* 2016), the time variation investigation (Salisu, *et al.* 2019 and Kuang 2017), the cointegration tests (Al-Nassar and Bhatti 2019), the comparative analysis (Akinsomi, 2020), the ARDL model (Afees, *et al.* 2020), the VAR model (Sangyup and Junhyeok 2022), etc.

Based on *markov-switching GRG copula model*, Kuang (2017) explored tail quantile dependences between the inflation rate and the real estate investment trust (REIT) return. Finding say that the positive and negative co-movements coexist. In the negative co-movement state, the REIT cannot hedge inflation risk, while in the positive co-movement state, the REIT has a partially hedging ability.

Later, Salisu, *et al.* (2019) examined the inflation hedging potential of the two most valuable precious metals namely gold and palladium. They employed both *time series and panel data techniques* for country-specific and group analyses. They concluded that both gold and palladium provide hedge against inflation in OECD countries notwithstanding the varying results across the individual countries. While the inflation-hedging potential of gold has been sustained, it only improves for palladium after the Global Financial Crisis. Their conclusions are sensitive to data frequency.

Recently, Akinsomi (2020) used a *comparative analysis of the year-to-date (YTD)* returns of global returns index and REITs sectors in the United States. They reveal that most sector REITs during the pandemic have lost considerable value based on YTD returns as at May 2020. Flight to quality is expected during this uncertain period to REITs such as data REITs, grocery-anchored REITs and storage REITs. These REITs are not as adversely affected by COVID-19 in comparison to other REITs.

Afees, *et al.* (2020) analyzed also asset-inflation hedging nexus for the US with the aim of determining inflation hedging characteristics of selected assets; stocks, gold, and real estates using the *bivariate and multivariate modelling* frameworks that taking into account of the asymmetry, the time-variation and the structural breaks. Founding say that inflation hedging tendencies of assets are heterogeneous across the considered assets. The real estates and stocks are proved to be good hedges against inflation, while gold investment defied Fisher's hypothesis. However, even the results are robust to alternative data frequencies, they are sensitive to the decomposition of data for pre- and post-GFC periods, indicating that asset-inflation hedging relationship for the US is time-varying.

Using a *Vector Autoregression* (VAR) model, Sangyup and Junhyeok (2022) provided systematic evidence on the relationship between inflation, uncertainty, and Bitcoin. Bitcoin appreciates against inflation (or inflation expectation) shocks, confirming its inflation-hedging property claimed by investors. The main findings hold with or without the COVID-19 pandemic episode.

To the best of our knowledge, only one study in the above literature has consider the *ARDL model* (Afees, *et al.* 2020) and only one which consider both univariate time serie and panel data analysis (Salisu, *et al.* 2019).

In this paper, we'll conduct an analyses on three developed countries including the United Kingdom, Canada and Switzerland for a period spanning from 1999 to 2018 covering the 2008 GFC period using univariate and panel ARDL models. We which to see if the asset-inflation hedging relationship for the considered sample is time-varying or not (say if results are sensitive to the decomposition of data for pre- during and post- GFC periods).

2. Models and Results

According to the GFH, in an efficient market, investors should be fully compensated for the increased price levels even if inflation decreases the value of money. Associated with perfectly competitive and informationally efficient capital markets in which investors are rational, the GFH postulates that stock prices should move *one-for-one* with goods prices to compensate investors for prices growth (inflation). This implies that stock returns should serve as a *hedge* against inflation, that is, *real* stock returns and inflation are independent. Consequently, we should observe a positive and *one-to-one* relationship between *nominal* stock returns and inflation rates.

GFH verification can be implemented in different specifications (static or dynamic). Dynamic specifications are considered and applied in the following sub-sections. Two type of data will be used: Time series and panel data.

2.1 The Panel ARDL Models

The framework and then methodology adopted in this paper are in two-fold; models with *heterogeneous slopes* and models with *homogeneous slopes*.

Case of heterogeneous Slopes

We consider a panel ARDL(p, q) framework formulating the Fisher dynamic equation as follows:

$$R_{it} = \alpha_i + \sum_{j=1}^p \delta_{ij} R_{i,t-j} + \sum_{j=0}^q \beta_{ij} INF_{i,t-j} + \varepsilon_{it} \quad (1)$$

We can reparametrize this model as the following ECM representation

$$\Delta R_{it} = \alpha_i + \varphi_i (R_{it-1} - \beta_i INF_{i,t-1}) + \sum_{j=1}^{p-1} \delta_{ij}^* \Delta R_{i,t-j} + \sum_{j=0}^{q-1} \beta_{ij}^* \Delta INF_{i,t-j} + \varepsilon_{it} \quad (2)$$

for $i = 1, 2, N = 3$ and t from 1999M01 to 2018M04 (TN = 696), where $\varphi_i = - (1 - \sum_{j=1}^p \delta_{ij})$, are the *speed of adjustment* to the long-run equilibrium, which is expected to be negative, $\gamma_i = \sum_{j=0}^q \beta_{ij}$, δ_{ij}^* and β_{ij}^* are the short-run coefficients (all are real parameters); $\delta_{ij}^* = - \sum_{m=j+1}^p \delta_{im}$, $j = 1, \dots, p - 1$, $\beta_{ij}^* = - \sum_{m=j+1}^q \beta_{im}$, $j = 1, \dots, q - 1$, the long-run coefficients $\beta_i = \frac{\gamma_i}{\varphi_i}$, and error-correction term $ECT_{it} = R_{it} - \beta_i INF_{i,t}$, ε_{it} is the error term which is independently distributed across i and t , while the term β_i are the *heterogeneous slopes*.

If $\varphi_i < 0$, then there is error correction, which implies that R_{it} and $INF_{i,t}$ are cointegrated, whereas if $\varphi_i = 0$, the error correction will be absent and there is no cointegration. This suggests that

the null hypothesis of no cointegration for cross-sectional unit i can be implemented as a test of $H_0: \varphi_i = 0$ vs $H_1: \varphi_i < 0$.

Alternative methods of estimation to Fixed Effect (FE) and Random Effects (RE) estimators are suggested in (Pesaran, *et al.* 1999); henceforth PSS. The mean group (MG) estimator for MG model and the pooled mean group (PMG) estimator for PMG model.

Case of Homogeneous Slopes

We consider the model with elements β_i are *common* across countries:

$$\Delta R_{it} = \alpha_i + \varphi_i (R_{it} - \beta \text{INF}_{i,t}) + \sum_{j=1}^p \delta_{ij}^* \Delta R_{i,t-j} + \sum_{j=0}^q \beta_{ij}^* \Delta \text{INF}_{i,t-j} + \varepsilon_{it} \quad (3)$$

Pesaran, *et al.* (1999) refer to equation (5) as PMG model. The main characteristic of PMG model is that it allows short run coefficients (δ_{ij}^* and β_{ij}^*), the intercept (α_i), the error correction term (φ_i), and error variances (σ_i^2) to be *heterogeneous by country*.

PSS developed the PMG estimator, where the long-run parameters β_i are constrained to be the same (Belke and Dreger 2013).

To specify a model (either (2) or (3)), we use the (Hausman, 1978) type test, and we determine the most appropriate estimator either Pooled Mean Group (PMG) or Mean Group (MG) [or Dynamic Fixed Effect (DFE)].³

As diagnostic for the results, we perform several *causality tests*.⁴ For the validity of considered models, there are several requirements. First, the coefficient on the error-correction term have to be negative and significant. Second, errors have to be White Noise (WN).

For the GFH to be hold, the slope restriction $\beta = 1$ should not be rejected (see, for example (Rushdi, *et al.* 2012 and Nassar and Bhatti, 2018)). Since the $\hat{\beta}$, estimate of the slope coefficient of the generalized Fisher relation may be less than 1 ($\beta < 1$) (Mundell, 1963 and Tobin 1965) or greater than 1 ($\beta \geq 1$) (Darby 1975), then common stocks will provide a partial or superior hedge against inflation. However, negative values of β suggest that the asset may act as a 'perverse hedge' against inflation.

Data Description

This paper uses a dataset for three ($N = 3$) countries, including Suisse, UK, and Canada over the period from 1999M01 to 2018M04 ($T = 232$). The stock price SP data is obtained from the investing.com while the consumer price CPI series is obtained from OCDE. We use a large sample that includes both the pre- and post-2008-2010 periods of the Global Financial Crisis (GFC). Data will be explored separately for time series (Panel A) and for Panel context (Panel B). In the first steps, descriptive statistics (average value, Median, Maximum, Minimum, standard deviation, Skewness, Kurtosis, Jarque & Bera (J-B) statistic and its p-value) will be presented. Results for both cases are given at Table 1.

³ We test the null hypothesis of homogeneity through a Hausman-type test. Under the null hypothesis of long-run slope homogeneity, both the PMG and MG estimators are consistent; however, only the PMG estimator is efficient. In other words, the Hausman test is used to compare the PMG and MG estimators. However, if the parameters are in fact homogeneous, the PMG estimates are more efficient. If we cannot reject the null hypothesis of homogeneity, data supports the PMG estimator to analyze the model.

⁴ Causality can be then determined using the significance of (i) Error correction term (ECT) for joint causality ($H_0: \varphi_i = 0$), (ii) Long run coefficients for long run causality ($H_0: \beta = 0$), (iii) Short run coefficients for short run causality ($H_0: \beta_{ij} = 0$), and (iv) the simultaneous significance of ECT and long- and short-run coefficients for strong causality ($H_0: \beta_{ij} = \beta = \varphi_i = 0$).

Table 1. Descriptive Statistics

Panel A: Time series Data for full period and by country.

| | Suisse | | UK | | Canada | |
|-------------|-----------------|------------------|-----------|------------------|-----------|-----------------|
| | R | INF | R | INF | R | INF |
| Mean | 0.004488 | -0.001005 | 0.000853 | -0.000826 | 0.003578 | 0.000604 |
| Std. Dev. | 0.048059 | 0.013286 | 0.035912 | 0.015755 | 0.037974 | 0.016252 |
| Skewness | -0.843526 | 0.194549 | -1.286033 | -0.898038 | -1.499048 | -0.357624 |
| Kurtosis | 6.141381 | 4.192009 | 7.489664 | 5.524600 | 11.05822 | 6.041953 |
| J-B | 122.3763 | 15.13321 | 257.6864 | 92.39512 | 711.5136 | 93.98870 |
| Probability | 0.000000 | 0.000517 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |

Panel B: Panel Data for full period.

| | LSP | LCPI | R | INF |
|-------------|-----------|-----------|-----------|-----------|
| Mean | 4.574954 | 4.618735 | 0.002973 | -0.000409 |
| Std. Dev. | 0.282254 | 0.143063 | 0.040963 | 0.015148 |
| Skewness | -0.452100 | -0.305948 | -1.112308 | -0.421325 |
| Kurtosis | 2.879325 | 2.795291 | 8.006419 | 5.622134 |
| J-B | 24.13208 | 12.07335 | 866.6297 | 219.0355 |
| Probability | 0.000006 | 0.002389 | 0.000000 | 0.000000 |

Empirical Results and Discussions

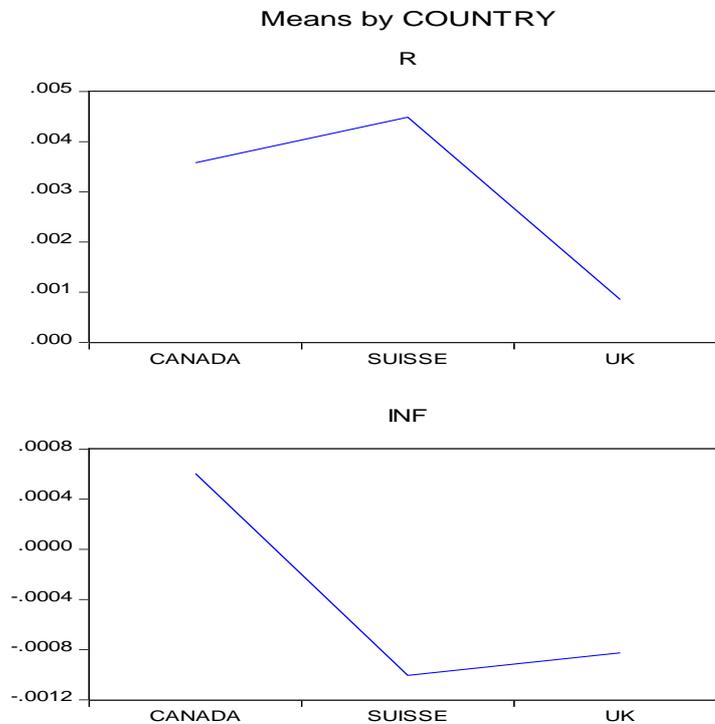
Table 1 (panel A), for each time series return (R = Δlog(SP) and inflation (INF = Δlog(CPI)), presents the descriptive statistics in average, we conclude that (see also Figure 1):

$$\bar{R}_{UK} < \bar{R}_{Canada} < \bar{R}_{Suisse},$$

$$\overline{INF}_{Suisse} < \overline{INF}_{UK} < \overline{INF}_{Canada},$$

where \bar{R} and \overline{INF} denote respectively the mean for R and for INF.

Figure 1. Average point estimate of R and INF by country.



For Panel Data (see Table 1 (panel B)), the same descriptive statistics are presented for prices in log (stock price LSP and consumer price index LCPI) and in first differences (return R and inflation rate INF). All skewness parameters are negative. Coefficient of kurtosis are greater than 3 for both

variables, R (almost equal to 8) and INF (almost equal to 5). J-B test statistics reject the normality assumption. All considered variables have not Gaussian distribution (we reject null hypothesis that the sample is Normally distributed at 5% significance level).

The second step in our analysis is to test whether the variables in levels [stock price in log (LSP) and Consumer price index in log (LCPI)] are stationary or not. To this end, we employ a battery of unit-root tests. As shown in Table A1 (see Annex) all considered unit root tests (LLC, Breitung, IPS, ADF-F, and PP-F) indicate that stock price in log (LSP) and Consumer price index in log (LCPI) are non-stationary. However, opposite results were obtained for variables in 1st differences; the stock return (R) and the inflation rate (INF). So that, variables in level are integrated of order one, i.e. I(1) or Difference-Stationary.

Our study will relate the monthly return on the three stock market to the monthly rate of inflation for the three countries over the period from 1999M01 to 2018M04 (TN = 693). We consider then the dynamic equation (2) and we report results of the PMG, MG, and DF methodology within panel ARDL framework.⁵ Table 2 shows the long run effects of inflation rate on stock return in four scenarios: for Full data set [1999M01–2018M04], for Pre the GFC period [1999M01–2007M12], during the GFC period [2008M01–2009M12], and for Post the GFC period [2010M01–2018M04].

When estimating panel ARDL equation (2), we use the maximum likelihood approach.⁶ We did not report the short-run coefficients because only long-run parameters have importance in the generalized Fisher hypothesis. The long-run results obtained from the PMG and MG and Dynamic Fixed Effects (DFE) estimator are given at Table 2.⁷

As shown in Table 2, the Hausman test provides evidence favorable to the PMG (DFE) estimator for Pre (Post) GFC period. During crisis period as well as for full period of study, Hausman test provides evidence favorable to the DFE estimator. Then, we can say that it is the GFC period result which drives the results for full sample case.

According to the results of PMG estimator and at Pre GFC period (Table 2), the inflation rate is not significant even at the 10% significance level, and we cannot reject the null hypothesis of $\beta = 0$. Then, results do not support long-run causality at Pre GFC period. But, short run causality test results indicate significant causality only for UK (at 5% level) and Suisse (at 10% level) stock market from inflation rate to stock return (we reject the null hypothesis of $\beta_{ij} = 0$). These results are not reported at Table 2 (but are available upon request). So, no strong causality can be deduced.

For the full period of study, the coefficient of inflation rate β is significant but is lower than unity ($\hat{\beta} = 0.39301$), while for the Post (Pre) GFC period, the coefficient β is not significant and is very lower than unity [$\hat{\beta} = -0.02227$ (0.0526)]. Thus, the results for full period do support a partial Fisher effect (and then long run causality from inflation to stock return is evident), while the Post GFC relation can be connoted by a worse hedge situation since $\hat{\beta} < 0$. This negative relationship post GFC can be due to the Money Illusion, Tax Effect, Proxy Effect, and/or Reverse Causality Hypotheses, and it may have important economic and policy implications. For instance, it would mean that investors would be better off in reducing their stock market investments in times of high inflation rates (Antonakakis, *et al.* 2017). However, during GFC period [2008M01-2009M12], a complete (or strong) Fisher effect does hold ($\hat{\beta} = 1.1683$), because the null hypothesis of $\beta = 1$ is not rejected at conventional significance levels (5%).

Additionally, the negative and significant error correction term estimator ($\hat{\phi}$) indicates that there is a joint causality relationship between stock return (R) and Inflation rate in all considered cases. Precisely, $\hat{\phi}$ indicates a causality from inflation rate to stock return that implying that inflation rate drives stock Return toward long-run stable equilibrium. This *unidirectional causality* from inflation to stock returns hints an *inefficiency* of these stock market which suggests that information on past

⁵ We used Akaike Information Criteria (AIC) to select lag length for each individual country regression.

⁶ This is done by STATA 15.

⁷ DFE estimates the dynamic fixed effects model where all parameters, except intercepts, are constrained to be equal across panels.

values of inflation could provide opportunities for abnormal gains from the return R particularly in GFC period.

Table 2. Panel ARDL model results; PMG, MG, and DFE estimates from equation (3), (2) and FE model respectively

| | | PMG | MG | DFE | Hausman 1 | Hausman 2 |
|----------------------|---|------------------------|------------------------|------------------------------|------------------|-------------------|
| Full | $\hat{\beta}$ | .272045 (.16612) | .3980174 (.42983) | .39302** (.170969) | 0.10 (0.7507) | 8.95 (0.0028) |
| | $\hat{\phi}$ | -.7327** (.05294) | -.76304** (.04677) | -.75712** (.037441) | PMG | DFE |
| | t-Statistic (H ₀ : $\beta = 1$) | 19.20*** | 1.96 | 12.60*** | | |
| Hedge ? | | | Yes | | | |
| Pre GFC | $\hat{\beta}$ | .0526565 (.285425) | -.0057294 (.302975) | .1118374 (.323041) | 0.33 (0.5656) | 0.15 (0.6957) |
| | $\hat{\phi}$ | -.73093** (.063249) | -.74223** (.065605) | -.71922** (.054234) | PMG | PMG |
| | t-Statistic (H ₀ : $\beta = 1$) | 11.02*** | 11.02*** | 7.56*** | | |
| Hedge ? | No | | | | | |
| Crisis period | $\hat{\beta}$ | 2.0566** (.489742) | 1.337227 (.973091) | 1.1683** (.541321) | 0.73 (0.3923) | 14.84 (0.0001) |
| | $\hat{\phi}$ | -.7621** (.12959) | -.90580** (.147341) | -.77628** (.13066) | PMG | DFE |
| | t-Statistic (H ₀ : $\beta = 1$) | 4.65** | 0.12 | 0.10 | | |
| Hedge ? | | | Yes | | | |
| Post GFC | $\hat{\beta}$ | -.099922 (.1765201) | .0403785 (.401032) | -.0222702 (.177838) | 0.15 (0.6968) | 12.91 (0.0000) |
| | $\hat{\phi}$ | -.85803** (.082799) | -.9102** (.067086) | -.90405** (.058561) | PMG | DFE |
| | t-Statistic (H ₀ : $\beta = 1$) | 38.83*** | 5.73** | 33.04*** | | |
| Hedge ? | | | No | | | |

Notes: (1) PMG estimates the pooled mean-group model where the long-run effects, β , are constrained to be equal across all panels. The short-run coefficients are allowed to differ across panels. MG estimates the mean-group model where the coefficients of the model are calculated from the unweighted average of the unconstrained, fully heterogeneous model. DFE estimates the dynamic fixed effects model where all parameters, except intercepts, are constrained to be equal across panels.

(2) The maximum number of lags for each variable is set at 1 and 0, and optimal lag lengths are selected by the AIC. Numbers in parenthesis are the standard errors. Probability value is reported for the Hausman test in parenthesis. Conclusion is given under p-value. ***, ** indicates 1% and 5% level of significance. Hausman 1 is to compare MG and PMG estimator. Hausman 2 is used to compare PMG and DF estimators. $\phi \equiv$ Speed of adjustment. (3) Three period are considered: Pre GFC from t = 1999M01 to 2007M12 (TN = 324), crisis period from 2008M01 to 2009M012 (TN = 72), and Post GFC period from 2010M01 to 2018M04 (TN = 300). Null hypothesis of no cointegration for cross-sectional unit i can be implemented as a test of $H_0: \phi_i = \phi = 0$ vs $H_1: \phi_i < 0$. Source: Authors' calculations. Detailed results of the panel ARDL estimation are available upon request from the authors.

In conclusion, from the panel data analysis, evidence in favor of stock returns acting as an inflation hedge is partially existent for the full period, completely or strongly existent during the GFC period, and not existent pre and post the GFC. The results confirm then that the relationship between the two variables (stock return and inflation) has evolved heterogeneously overtime (Pre, during, and Post Global financial crisis (GFC)).

Conclusion

As mentioned earlier, there is no general consensus among empirical research on the validation of GFH (Antonakakis, *et al.* 2017). In addition, all the studies in the literature are based on time series

data, and few papers, to the best of our knowledge, use panel data. This paper intends to bridge this gap and make some contributions to the empirical literature on the Generalized Fisher Hypothesis (GFH) and the inflation-hedging ability of countries commons stocks market. To this end, we consider a panel data from three democratic countries, including Canada, UK, and Suisse from 1999M01 to 2018M04 covering the 2008 GFC period.

Besides empirical studies based on time series data (details are not reported, only a sum up is given in Table 3 hereafter),⁸ we demonstrate that the results can be more informative with panel data. As well, it is of great importance to see if the long run relationship between stock return and inflation can evolve heterogeneously overtime.

Findings confirm that GFH tests give different conclusions over considered sub-periods with either univariate time series or panel data. Results are sensitive to the decomposition of data for pre- and post-GFC periods, indicating that asset-inflation hedging relationship for the considered sample is time-varying. Table 3 gives a sum up of all the previous results. Looking at Table 3, panel data reveal unambiguous unstable relationship between return and inflation that is driven by Suisse stock market case.

Table 3: Results for inflation hedging in the full period, pre- during and post- GFC.

| Data | Suisse | UK | Canada | Panel |
|-------------|--------|----|--------|-------|
| Full period | Yes | No | Yes | Yes |
| Pre GFC | No | No | Yes | No |
| GFC | Yes | No | Yes | Yes |
| Post GFC | No | No | Yes | No |

Note: This is a sum up of Table 2. Details of univariate ARDL results are not reported here but are available upon request. The results of first, second, and third column are the sum up of univariate time series models.

Based on the panel data analysis, results demonstrated that hedging property against inflation is true only during GFC crisis. And then, the major implication from eventual ability of financial assets to hedging against inflation is to encouraging investment and saving decisions in the three considered economics during crisis period as the GFC case (here deflation period). Indeed, since Suisse and Canadian stock return has a positive relationship with inflation, then including the UK in a portfolio allows investors to limit losses caused by inflation in UK stock market alone. Then, being simultaneously on the three considered market, investor will have some abnormal gain only during crisis period (here period of deflation).

⁸ Based on univariate time series data, we conclude that Canadian (UK) stock return is (not) a hedge against inflation for the three sub-periods, while Suisse market return is a hedge against inflation only during GFC crisis. During crisis both Suisse and Canadian stock returns are superior hedge against inflation. Post crisis, the Canadian stock market is unique to be full hedge against inflation (this result is in accordance with (Richard and Ran, 2021)). No significant relationship is found in the UK context during crisis period (period of deflation). In addition, post and Pre crisis, UK stock market is found to be worse hedge against inflation.

ANNEX

Table A 1: Panel unit root tests at level and first difference (full period).

| | | LSP | | LCPI | |
|--|-----------|-------------------|-----------|-------------------|--|
| Method | Statistic | Prob.** | Statistic | Prob.** | |
| Null: Unit root (assumes common unit root process) | | | | | |
| LLC t* | 0.39027 | 0.6518 | 0.70864 | 0.7607 | |
| Breitung t-stat | -1.83138 | 0.0335 | -0.69113 | 0.2447 | |
| Null: Unit root (assumes individual unit root process) | | | | | |
| IPS W-stat | -0.49646 | 0.3098 | 0.45263 | 0.6746 | |
| ADF - Fisher χ^2 | 6.48521 | 0.3711 | 3.92995 | 0.6862 | |
| PP - Fisher χ^2 | 6.75911 | 0.3437 | 3.94596 | 0.6840 | |
| Conclusion | | I(1) | | I(1) | |
| | | R | | INF | |
| Method | Statistic | Prob.** | Statistic | Prob.** | |
| Null: Unit root (assumes common unit root process) | | | | | |
| LLC t* | -28.4817 | 0.0000 | -30.8294 | 0.0000 | |
| Breitung t-stat | -14.3854 | 0.0000 | -13.0169 | 0.0000 | |
| Null: Unit root (assumes individual unit root process) | | | | | |
| IPS W-stat | -21.5516 | 0.0000 | -23.2148 | 0.0000 | |
| ADF - Fisher χ^2 | 263.928 | 0.0000 | 287.948 | 0.0000 | |
| PP - Fisher χ^2 | 267.942 | 0.0000 | 287.721 | 0.0000 | |
| Conclusion | | Stationary | | Stationary | |

Note: LLC \equiv Levin, Lin & Chu, IPS \equiv Im, Pesaran and Shin.

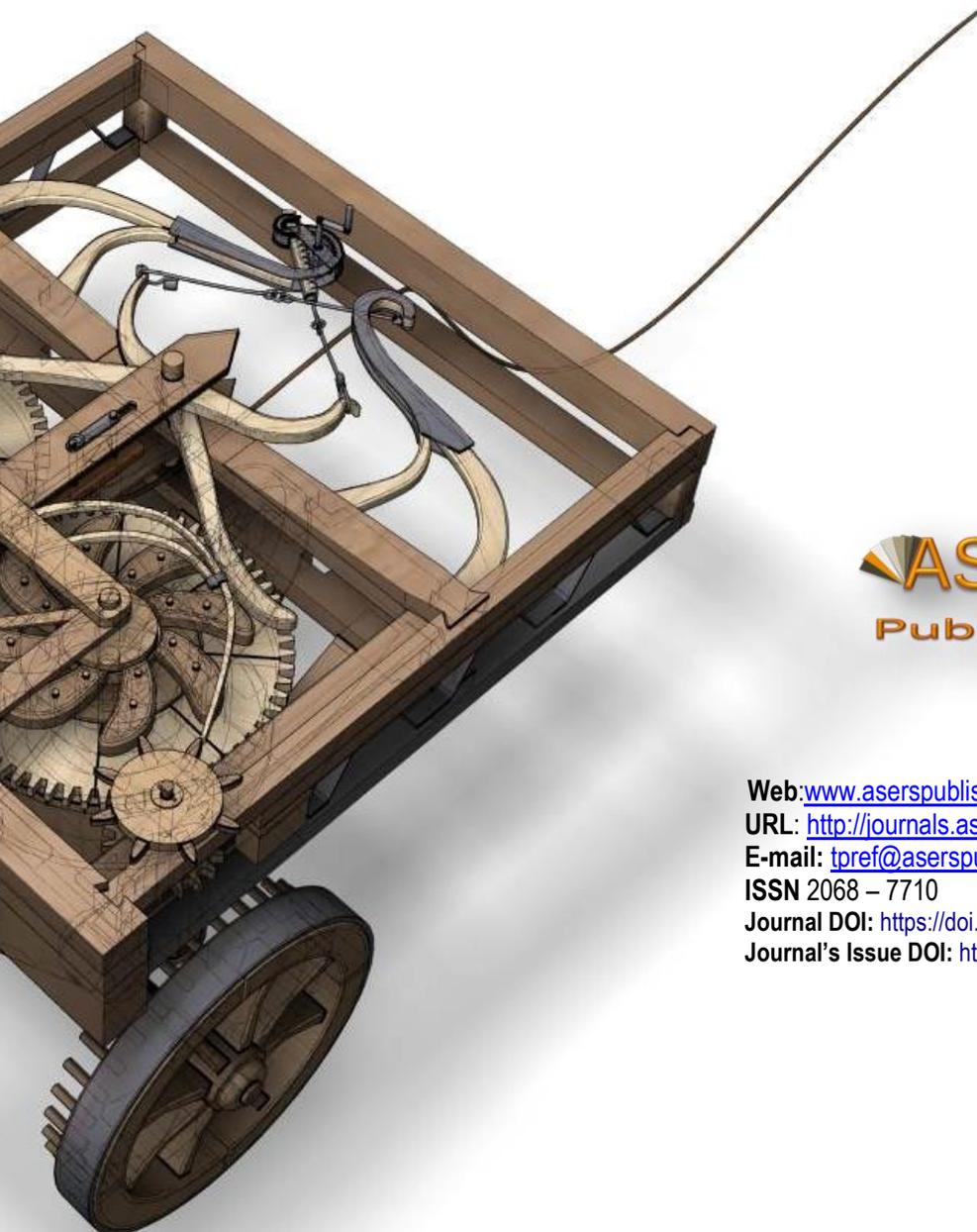
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