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THE REDENOMINATION PROCESS AND ITS RISKS IN THE CONTEXT OF MONETARY UNIONS

Professore Paolo Canofari

SUPERVISOR

ID No. 238051

CANDIDATE

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INTRODUCTION

The redenomination, if not a new issue in economics, is a very topical question since the financial crisis of 2008 and especially the Greek crisis in the European monetary union in 2009. As a matter of fact, Greece was close to exit the European monetary union and this was the first time in Europe that the possibility of an exit of a eurozone member was seriously discussed. Between 2010 and 2013, there were many expectations of countries exit from the eurozone due to high public debt. The issue of redenomination is still debated in Europe especially when political leaders of countries as Italy or France do not want to respect the stability pact or might be forced to reduce the public debt.

The common currency appears indeed overvalued for most countries, and especially for Spain, Italy, Belgium and France according to the International Monetary Fund (IMF). This is an important disadvantage for their exports and their trade deficits reach very high levels.

The redenomination process concerns the currency. Yet, as we know, money is traditionally defined in terms of three basic functions: money serves as a unit of account, as a medium of exchange, and finally as a store of value. We will now remind these functions.

Firstly, as a unit of account, money is used to define the intrinsic value of a currency over another and the value of the exchangeable goods and services inside a country and internationally. In the past, this value was fixed by reference to precious materials, particularly gold and silver, then only gold. This value guaranteed the convertibility of money into gold to give confidence to the money holders.

Until the early 70's, with the Bretton Woods gold exchange standard system created in 1944, the US dollar was convertible into gold and was therefore the international reference currency. This fixed but adjustable exchange rate system was based on two major financial institutions: International Monetary Fund and World Bank. The IMF's primary purpose was to ensure the stability of the international monetary system, and the World Bank was supposed to help Japan and European reconstruction after World War II by providing loans. The dollar was used in 90% of the total goods and services exchanges in the world. In 1973, the United States could not guarantee the convertibility of the dollar into gold anymore, due to insufficient gold stocks in comparison to the American deficit: the Bretton Woods agreements were given up officially in 1976 by the Jamaica agreement. Thus, the end of the Bretton Woods agreements had two major effects over the United States and globally over the world: the payments in dollar decreased when alternative currencies were preferred because of successful internal macroeconomic policies, and it pushed the other countries to recreate a fixed but mostly adjustable exchange rate system.

The European Union made this choice with the European Monetary System (EMS) in 1978, then with the creation of the common currency, the euro, in 1999 and its actual entry into circulation in 2003. However, despite the economic weight of Europe and the strength of the euro, this currency never managed to exceed 25% of the whole international money demand. This interesting fact points out that using a money as a unit of account is henceforth a matter of confidence in the issuing economy, and of its weight within the international exchanges as well.

Recently, this subjective element became stronger with the apparition of cryptocurrencies (digital medium of exchange) expressing the goods and services value in a common unit for those accepting it. The bitcoin for instance is a type of digital payment currency invented in 2009, created at a fixed rate and used in peer-to-peer online, completely decentralized with no central authority. It was decided that the maximum and total amount of bitcoins that can ever exist is 21 million in the creation protocol, and nowadays it is considered as the biggest cryptocurrency with about 17,9 million in July 2019.

As a medium of exchange, money allows the exchanges development by creating a common unit for relative prices; then, everyone is able to sell whatever they want in order to buy whatever they desire, without using bartering of goods and services.

As store of value, money is used to keep the savings into monetary assets, allowing people to convert it immediately if they need to. If the money has meanwhile depreciated, the savers will then logically lose a proportional value of these liquid resources.

These three components of the money highlight the importance for a country to maintain the value of its money especially because it helps it to import the goods and services for much lower prices, to attract international investors, to finance its public debt, to invest in foreign countries and finally also to afford a powerful capacity to help the weak and underdeveloped countries. As a result, the exchange rate should be at its right level. Indeed, if it is overvalued, the real exchange rate would increase, implying a deterioration of the economy competitiveness. The contrary applies, if the exchange rate is undervalued. To obtain these results, it seems clear that countries must follow a strict discipline in the management of the monetary policy. This means introducing a money issue in relation with the real economic growth, the economy competitiveness and overall its budgetary constraints. Nevertheless, a contradiction immediately appears when real conditions of the economic and social growth are not in line with the money official value, it leads to an excessive expansion of the money supply, a rise in goods and services prices, an increase in the interest rate level and also a competitiveness drop. Many countries could not manage this situation and they suffered from hyperinflation and a defiance of their currency like Argentina over the period 1999-2002.

After a difficult adjustment period and a loss of confidence in their currencies, dependence on foreign creditors, and sometimes the suspension of the currency convertibility, this situation leads to a redenomination process that can take many forms: currency defined in relation to the old one on a national basis (Argentine peso, new French franc, Zimbabwean dollar), currency having a reference to another one (Mexican peso in relation to the dollar), or entry in a monetary zone and acceptance of the common currency.

Anchoring a currency is often an important issue and a question of debate amongst the economists. On the one hand, they generally agree to say that a highly overvalued currency in relation to the country's competitiveness (including productivity, products quality and ability to manage efficiently its public finance) is not an option in the long run. This situation creates inflation, and even sometimes hyperinflation, leading to many high magnitude currency devaluations to restore competitiveness, by decreasing exports prices with the bad consequences it has on imports prices. That is therefore the main reason why many economists usually advise the governments to maintain the sovereignty on their monetary policy, instead of devolving it to the governors of the Union central bank they could wish to enter. Indeed, maintaining this full sovereignty on monetary policies allows any government to use this important economic tool during the implementation of countercyclical policies when they are necessary, such as more accommodating budgetary policies. This "stop and go policy" is based on both a monetary and a budgetary mix. These types of policies were defended by the Keynesian theory.

On the other hand, an alternative vision (which can be seen as oriented on the offer side) points out the benefits of a strong anchorage of the currencies, the European monetary union made this choice. In this view, a real adjustment is the only one to implement in case of economic troubles by controlling public expenditures, increasing productivity gains, wages controlling and so on. Devaluations no longer exist because they no longer need to.

The common currency is supposed to be stronger, primarily because it hinges upon several important economies, and allows it to become an international currency, along with the following collateral benefits: imports payments by currency issuing and attracting foreign investors, like the US dollar for example. For leader countries, this option appears to be the best one, because of their good competitivity gained from their industrial sector development and the relationship between the productivity and the labor cost. However, there is a clear risk of the common currency overvaluation in relation to the real competitiveness in the Union countries, and especially the leading ones. In the particular case of the European Union, the deutschmark is the reference currency.

This explains why some countries like Sweden and the United Kingdom refused to join the monetary zone, or why Yanis Varoufakis (the former Greek Minister of Finances by the time of Greece financial crisis) refused the imposed economic adjustment to Greece by the European Union. For peripheral countries such as Ireland or Spain, the situation is more complex because the monetary zone is very heterogenous and they suffer from bad competitiveness as they do not gather the conditions to stand the exchange rate level and its consequences. According to Paul Krugman, "the core countries that are exporting deflationary pressures into the periphery, a dynamic contrary to that needed to reverse the real exchange rate appreciation that has eroded the periphery's".

Regardless its type, a redenomination implying depreciation immediately leads towards strong currency benefits loss, and it generates an increase of imports prices along with a recession trend, higher interest rates and capital flight. Before the competitive gains take place, when the volume of exports increases (*J-curve*[1]), the central bank will then have to boost the economic activity and the public expenditures in relation to competitiveness. Yet, this policy is likely to create hyperinflation.

Redenomination occurring when a country leaves a monetary union may be a very long and complex process, due to technical issues concerning solidarity between member states and banking systems. When the Greece crisis took place, the deficits were so high that several European banks would have suffered a lot from

[1] *J-curve: time path of a country's trade balance after a devaluation or depreciation of its currency, under certain assumptions.*

a Greece exit. Similarly, the monetary unions policies benefit all members which become dependent from the unions support. In Europe, since 2008, the European Central Bank has been implementing an unconventional monetary policy known as quantitative easing monetary policy to help members facing the financial crisis; it is still operational, and it seems very harsh for a lot of them to succeed without it. Therefore, it appears that redenomination raises important questions beyond the theoretical debate, and that every country has to take into account the costs and the benefits brought by a monetary union, which can change depending on the context.

To study every process of redenomination concerning a monetary union, we will explain in the first chapter the concept of monetary unions, what are their goals, benefits and challenges, and finally talk about the major historical and modern examples. Then, we will study throughout the second chapter the notion of redenomination, the process to achieve it, and the different situations in which it can occur. Eventually, in the third chapter, we will discuss the redenomination risks, explain how they are measured and the cases in which a redenomination is a success or not.

CHAPTER 1: MONETARY UNIONS

A) Definition, goals and risks of monetary unions

First of all, we can affirm that defining a monetary union is quite complex, since this term is often used to describe distinct things. Yet, in the context of this thesis, the most appropriate definition that we can give is the following one. A monetary union (also known as common currency Union) corresponds to an agreement between multiple states devolving the supply of money control to a common authority, thus creating a single currency area. This type of Union can easily be related to a fixed-exchange-rate Union, but the difference stems from the fact that in a monetary union, the main characteristic is that a unique currency is common to every state member, whereas a fixed-exchange-rate Union preserves separate national currencies. Besides, sharing a unique currency implies that the monetary union sets up a common monetary policy and establishes a single central bank. This principal central bank can be composed by all the individual central banks.

1. *The Mundell optimum currency area theory*

An interesting theory on monetary unions is the "optimum currency area" theory, developed in 1961 by the Canadian economist Robert Mundell, which delivers four criteria that define a monetary union as an optimal one.

The first is that an optimum currency area must have an increased labor mobility throughout the zone. This implies free movement and easy travels among the members, erasing cultural barriers such as different languages, and the establishment of institutional policies.

The second criterion concerns the capital mobility along with the price and wage flexibility. More than labor, financial resources must also be easily exchanged among the members to boost trade. This also includes a facilitated distribution of money where needed to balance the economic system.

The third one is the existence of a currency risk-sharing system. This means that money has to be distributed to regions in financial distress or less developed. Nevertheless, it is difficult to set for political reasons because wealthy countries will not accept to give up their surpluses.

Finally, the last of the four criteria described by Robert Mundell to define a monetary union as optimal is the similarity of business cycles. Every member should have similar business cycles so that the central bank can rebalance any economic recession or boost by promoting growth and curbing inflation.

According to Robert Mundell, an optimum currency area leads to two main advantages for members: a reduction costs for trade across borders and the related ease of knowing various prices. It implies also a major disadvantage that is the difficulty of maintaining full employment in the currency area when a country alone is impacted by a shock.

If these four criteria are not shared by the countries and that they do not react the same way to external shocks, Robert Mundell advice the countries to keep their own local currency as adjustment tool to restore economic stability. However, this theory only considers the monetary union creation and does not study the case of a country future entry or exit.

Even if the creation of the European monetary zone was inspired by this model, we can see that some of those criteria were not really met and are still not today: in particular the labor mobility between the countries or similar business cycles due to the members economic heterogeneity.

Anyhow, the euro creation was considered by Robert Mundell as the major event concerning the world financial system since the Fed creation in 1933, and he was one of the most important defenders of the European monetary union.

2. *The goals and benefits of monetary unions*

There are different aspects explaining the goals of forming or joining monetary union. From an economic perspective, we can deduce that a monetary union helps eliminating the transaction costs that would previously occur if an exchange of currency took place among countries. Indeed, there is a common exchange rate among all the members, so the Union can be seen as a single geographical union in which cash flows are made much more flexible and costless. This implies that the trade in the monetary union is attended to grow significantly.

An example can better explain this idea. If we consider that one member of a specific monetary union, for instance Germany in the European monetary union, wants to buy one product from a foreign supplier. Germany has the choice between two different countries: on one side France, which is also a member of the European monetary union, and on the other side the United States of America (USA), which do not belong to it. No matter if the price of this supply is lower in the United States than in France (higher reciprocally), Germany will choose to buy from French suppliers (USA reciprocally). This is due to the fact that there are no anticipated variations in the exchange rate with France, whereas they exist with the United States and could possibly rise the dollar's value before the time of payment, hence suppressing this advantage in the long term. Indeed, a monetary union removes the currency risk among its members and is then supposed to increase rapidly trade intra-Union. In 2018, Germany and France are the first two customers and suppliers from Italy. Furthermore, increasing the cash flows between countries promotes any other form exchange. If two or more countries enter the same monetary union and share a common currency, exchanging any product (money or goods) is easier as there is no need to apply the exchange rate to the currencies. As more exchanges occur, these countries will trust each other and engage in more trades.

A monetary union has also political goals as it is based on trust among the members which are fully integrated, and this can prevent from future conflicts. For instance, in the present European monetary union, every country is linked with the others and they all act in order to help the others economically speaking, which has positive political impacts. The recent Greek example describes this, as European countries all brought help to Greece during its harsh financial crisis. The partners tend as well to share political and cultural values as political democracy for instance.

The removal of the exchange costs and the convenience of using the same currency in the monetary union facilitate all flows through the countries of the Union and promote the share of knowledge and values. People have less difficulties buying foreign products as they know that they will not have conversion issues within the monetary union. Therefore, global international trade grows, and this induces political benefits as well as social ones. Nevertheless, apart from these benefits, the creation of a monetary union represents many challenges to overcome as well as disadvantages too.

3. *Challenges faced during the foundation of monetary unions*

Firstly, the creation of a main central bank leads to a loss of each country's control over its own national monetary policy. Some economists consider this an abandonment of monetary sovereignty. This has a negative impact over countries whose monetary policies influence the level of activity in its economy. The monetary policy applies to all the members. For instance, if one country not belonging to a monetary union enters a downturn of its business cycle, implying a decrease of growth, the central bank can implement an expansionary monetary policy. This policy will increase the supply of money in circulation, and therefore reduce the interest rates, which will stimulate consumption and investment spending. Finally, production will increase. However, if this country was part of a monetary union, this process would be more difficult to set because it is specific to this country. Implementing this expansionary monetary policy to all the members could be harmful for some and this is why coordination is made very difficult as it depends on the economic situation of each state.

It is said for example that the monetary policy in the eurozone is influenced by Germany which main priority concerns the struggle against inflation and thus against accommodative monetary policy. Even though the monetary policy of the European Central Bank (ECB) has changed after the 2008 financial crisis and the implementation of the quantitative easing.

The main reasons why countries would want to form or join a monetary union hinge on these goals, benefits and challenges. If two or more states feel inclined to facilitate flows between each other, they might be keen on forming a monetary union. Logically, depending on the country and its predispositions, it can be either positive or negative. Once again, studying the European monetary union will bring a much clearer point of view concerning this aspect. We can focus on two major European countries: Italy and Germany.

4. *Why creating or forming a monetary union? The Italy and Germany study case*

Before the euro, Italy's currency was the Italian lira and Germany's currency was the Deutsche Mark (DM). We must discuss whether the adoption of the euro by these two countries has been beneficial or not. Yet, we have to define what is a weak or strong currency, and how it is determined.

Saying that a currency is weak or strong means that their market price is above or under its real value. It is commonly said that there is not only one measure of the overvaluation or undervaluation of a currency, but rather an estimate range. This weak or strong status is officially given by the International Monetary Fund (IMF). The IMF refers mainly to the external surpluses or deficits of each national economy, which considers the commercial trades of goods and services. It also includes the level of salary costs, or even the demography. These are obviously not the only criteria taken into account, but the calculus is extremely complex and done by experts. However, we will refer to the IMF results as they are definitely the most trustworthy. According to the IMF studies, the Italian lira was undervalued and very weak during the 1990s, right before the implementation of the euro. On the other hand, the DM was already a powerful and overvalued currency.

Now, we can study both cases and check what were the consequences of their respective entry in the eurozone. At first sight, we can possibly think that for both of them, joining the eurozone would be a very positive experience as it would adjust the power of both their currencies: the lira will not be undervalued anymore, and the DM will not be overvalued anymore. Yet, it also depends on other factors less evident.

In 1992, the Italian state goes through financial difficulties. The country leaves the European monetary system and its currency devaluates quickly. Between the 9th and the 16th of August 1992, the Italian lira loses approximately 18% of its value compared to the dollar. In March 1993, it loses around 50% of its value. This causes dramatic damages over the purchasing power of the households, but nonetheless allows the Italian economy to become more competitive and adjust its trade balance. Therefore, it is obvious that Italian’s lira was undervalued before the euro.

In Germany, the exact opposite situation is taking place. The DM is overvalued, which implies a loss of competitivity in the country, a low growth (estimated at only 0.8% in 1996 against 5.1% in 1991) and consequently a very high unemployment rate (it equals 9.9% in December 1996 against 5.5% in 1991). The cost of labor is too high as well.

We can conclude from these two examples that both countries would gain many benefits from forming or joining the eurozone, as their currencies were not safe. Germany had problems due to overvaluation, and Italy due to undervaluation. The entering into force of the euro between 1999 and 2002 was supposed to resorb all these complications. Notwithstanding, this was not the case for Italy. Indeed, to benefit from a monetary union, a country has to strengthen its economy to remain competitive, as using devaluation to be competitive is not possible in a monetary union. As we have seen, this tool was mainly used by Italy before joining the eurozone. As a result, Italy’s loss is now estimated at about 530 billion euros between 1999 and 2017, which approximately corresponds to 8,756 euros per inhabitant. On the contrary, Germany, which was not used to devaluate its currency to be competitive, is supposed to have gained 280 billion euros within the same time frame, which is worth 1,116 euros per inhabitant.

Finally, we have seen in that first subsection that countries lay great hope on monetary unions as it can bring many benefits to the members on economic, political and social perspectives. Indeed, a monetary union helps increasing the international trade between the countries and can provide sustainable peace by essence. Before making a decision, the countries must measure the risks and challenges of these unions as they can overcompensate the advantages. Forming a monetary union is very difficult and every member has to be very rigorous not to be losing from the agreement, as they will face a lot of challenges. This is a tough decision requiring profound and rational thinking.

B) Historical examples before the XXth century: good points, mistakes and conclusions

When we look back hundreds and even thousands of years in the past, we can observe that since the dawn of times, as soon as the first civilizations rose, unions already appeared, no matter how primitive they were. This feeling of trust and alliance between different populations seems to have always existed, under many various forms before reaching its modern signification.

1. *Antiquity*

Returning back to our context, we can already find the premises of what we call today a monetary union dating back to the Antiquity. At this time, the situation was even more complex, mainly because the notion of national money was not even widespread at all. Yet, the idea of sharing the same currency among diverse cities was already taken into consideration this early. Indeed, Macedonian sovereigns, like Alexander the Great, who ruled from 336 to 323 B.C, had already imposed a standardized currency within the frontiers of their territorial conquests.

Still, the main cities issued their own currencies. For instance, back in the Ancient Greece, each city possessed its own currency; during the Roman Empire, there was a centralized coinage for gold and silver, but a regional one for bronze, copper and brass. However, though presenting some similarities with our modern monetary unions, these first historical examples do not correspond to significant and exact ones. This notion of fragmented money within a same country lasted until not so long ago for some countries: Italy had it until the XIXth century, and Switzerland until 1848, for instance. The same situation was also seen in some other countries, among which we can find Spain, Portugal, the Austro-Hungarian Empire, Scandinavian countries or Eastern countries.

The closest form of monetary union from those existing nowadays emerged during the XIXth century. These were the first attempts of this so-called utopian unification. In this part, we will therefore focus on four examples of these early monetary unions, which were also the most important ones by then, in chronological order: the German Union, the Latin Union, the Scandinavian Union and finally the Austro-Hungary Union.

2. *Presentation of the German Union*

At the beginning of the XIXth century, Germany is composed by more than 500 States: kingdoms, Grand Duchies, Duchies, Principalities, Electorates and other independent towns. This situation causes an understandable huge monetary disorder, mainly within small states. As a result, the State has no other option than to introduce a monetary union within Germany. The first step of this action takes place on the 18th of January 1828. The Kingdom of Bavaria and the Kingdom of Württemberg are the first to initiate a treaty creating a customs union linking them to the Principalities of the Hohenzollern.

This first alliance triggers new actions by other German states. On the 22nd of March 1833, a treaty named "Zollverein" is signed, establishing a customs union between Prussia, the Principality of Anhalt-

Bernburg, the Principality of Anhalt-Dessau, the Electorate of Hesse, the Kingdom of Bavaria, the Kingdom of Württemberg as well as the Principalities of the Hohenzollern, joined by the Kingdom of Saxony and the Free State of Thuringia. The Zollverein foresees a monetary unification and the settlement of a common currency. It is formally started in 1834.

On the 25th of August 1837, the South German gulden currency is adopted by six states (Bavaria, Württemberg, Nassau, Hesse, Baden and the free city of Frankfurt) which sign at Munich two conventions declaring this agreement. The Duchy of Saxe-Meiningen joined on the 8th of June 1838 and the Principality of Schwarzburg-Rudolstadt on the 11th of May 1839, which reinforces this monetary union. Nevertheless, this Union represents a threat for the Northern states of Germany, so Prussia proposes already in August 1837, right after the implementation of the new currency, an enlargement of these negotiations in order to establish this new currency in Northern Germany.

The final monetary agreement encompassing most of the country is eventually found in July 1838. Yet, many other regions joined it throughout the entire existence of the Zollverein, the lasts to date being the city-state of Hamburg and the city-state of Bremen. The German monetary union lasted until 1919, soon after the end of World War I.

3. *Presentation of the Latin monetary union*

Elsewhere in Europe, the situation is quite different. The coin organization relies on a bimetallism system. Bimetallism means that a currency is related to two metals, here gold and silver. However, in 1865, the flows of gold metal in the European markets increase a lot, troubling that coin system as more gold coins are minted. Indeed, the worldwide supply of gold has been completely boosted by huge gold discoveries in regions such as California and Australia. As a result, the market price of silver relative to gold increases very significantly, and the silver coins are therefore immediately removed from the circulation. Four countries, Switzerland, Italy, France and Belgium, are constrained to take some legal measures in order to solve this silver leak.

Switzerland experiences a drain of silver coins, as the population trusts its national currency no more, in contrary to the French gold, which consequently replaces Swiss silver coins, provoking a situation of *economic parasitism*[2]. Italy faces the same challenges and eventually provides legal tender to French coins in 1862. In France, gold becomes hugely predominant in 1861 and paper money represents only between 10% and 20% of the circulation in 1862.

Finally, Belgium, for its part, already provided legal tender to French and Dutch coins in 1832 and widely benefits from it until the government decides to set a national currency, based on a silver monometallism system (currency related to only one metal) in 1850. It is then obvious that the drain of silver coins ten years later has drastic and terrible consequences on Belgium, since every Belgian silver coin

[2] *Economic parasitism: when one country depends economically on another one and acts like a "parasite". Here, Switzerland needs French gold for its own economy's welfare.*

immediately disappears. Ferdinand de Meeûs, the governor of "La Société Générale" (a French bank) at the time, claims in 1861 that silver is now only used for "crockery" and launches a return to bimetallism by law on the 4th of June 1861. For the four countries, this cash scarcity induces a weakening of the *fiat money*[3], which is evidently a great disaster for the economy.

Despite several commissions, no solution is to be found. Eventually, during the 1865 Convention, a new monetary union is formed by treaty on the 23rd of December, named the Latin monetary union. The members of this Union are the exact same four countries, already linked as we just explained because of their common use of French gold.

This treaty, signed during the 1865 Convention, implies for the four states the establishment of freely exchangeable gold coins and silver coins, according to common specifications. They agreed on a bimetallism system. The official initiation of this agreement takes place on the 1st of August 1866. The main difference with modern monetary unions and the German monetary union is that trades are facilitated not because the currency is the same (they preserve separate currencies) but because any member could ensure the conversion of its currency into another member one during exchanges, with confidence that no value would be lost.

For instance, if a French company wanted to sell goods in Italy, it could accept the Italian lira and convert it into a same amount of French francs. This Union also differs from the German one by the fact that it links true distinct countries, whereas the German one can be more associated with a national unification of an entirely puzzled country.

Soon enough, other European countries start to feel inclined to join this Union, perceiving it as a great opportunity economically and financially speaking. Greece is the first and last to enter this Union apart from the founding members, on the 10th of April 1867, after the International Monetary Conference of 1867 which had just taken place in Paris. Indeed, this treaty explicitly specifies that any foreign country which agreed to abide by it have the right to be admitted within the monetary union. In 1908, Greece reduced the amount of gold within their coins, therefore debasing the currency and violating the initial agreement. It has been rejected from the Union but finally was accepted again in 1910.

Along with Greece, both Spain and Romania also consider joining by then and therefore attempt to reach the required currency standards of the Union, but the process is unsuccessful. Austria-Hungary reaches the gold standards and signs a separate treaty with France on the 24th of December 1867, because it refuses to use bimetallism and only relies on gold.

Later on, many other states also apply this system without officially being part of the treaty. For instance, Peru adopts on the 31st of July 1863 the franc system, accompanied by Colombia and Venezuela in 1871. The following countries are the Grand Duchy of Finland in 1877, Serbia in 1878, Bulgaria in 1880, the Danish West Indies in 1904 and finally Albania in 1912. All these countries minted coins according to the Latin Union without officially being part of it. The Union finally disbanded in 1927, once again not so long after the end of World War I.

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[3] *Fiat money: includes any currency in circulation that is not backed by a physical commodity, such as paper money or coins.*

4. *Presentation of the Scandinavian monetary union*

Afterwards, another of these monetary unions from the XIXth century is formed in the North of Europe, after being inspired by the previous ones and having understood what benefits they could also gain by forming one. The three Scandinavian countries, Denmark, Norway and Sweden, are willing to compete with the already existing systems. Until then, they all used a currency called Speciedaler (the name was the same across the three countries, but the weight was slightly different). On the 18th of December 1872, a Convention is signed, resulting from the Copenhagen Conference which held from the 16th of August to the 20th of September 1872. This Convention is ratified by Denmark and Sweden, opting for a new currency known as the golden krone, after examining and refusing the French and German monetary systems. At first, Norway refuses to be part of it in an attempt to affirm its independency. Indeed, the country is already dependent to Sweden since the Kiel Treaty of 1814 and wants to steer clear from this Union as it does not want to seem even more under its neighbor country's control.

The Convention is reaffirmed on the 27th of May 1873 and the two countries claim that Norway can have the possibility to join the Union any time before its dissolution, which is then foreseen in 1883. Finally, Norway formally joins the Scandinavian union on the 16th of October 1875. In 1885, the union is reinforced by another Convention, allowing the three national banks to open current accounts in foreign ones.

These current accounts facilitate any monetary flow inside the Union, to the point that any single banknote is accepted in the circulation of the three members. This recalls the modern monetary unions. In 1905, the political Union between Sweden and Norway is dissolved but the Scandinavian Union truly ends during World War I.

5. *Presentation of the Austro-Hungary monetary union*

In 1867, the last of the major monetary unions from the XIXth century is created: the Austro-Hungary monetary union. It is often not classified as such, but it is nonetheless the closest form to our modern monetary unions of all these historical monetary unions from this century. At this time, Hungary was not an independent country, it was part of the Austrian Empire, but it differed from the rest of the Empire because it possessed its own administration and institutions.

This situation started after the Hungarian Revolution of 1848, during which the Kingdom of Hungary nearly brought down the Austrian Empire but was finally defeated when Russia brought help to Austria. Hungary was then punished for this attempt but preserved obtained some self-sovereignty. However, a series of military defeats from the Austrian Empire, mainly at the Austro-Prussian war during the final battle of Königgrätz in 1866, pushed the government to enter negotiations with Hungary, in hope of a reconciliation to reinforce its power and also regain an international great status.

Therefore, an agreement known as the 1867 Compromise is signed between the Austrian Empire and the Kingdom of Hungary, allowing Austria to recover full sovereignty over Hungary in exchange of sharing power on equal footing. This Compromise resulted in the Austro-Hungarian Empire. It required a common currency, along with a preserved independence in terms of fiscal sovereignty. Both shared a common market, trade policy, foreign policy, army and monarch (proving the political extent of this Union).

Focusing only on monetary terms, the currency of the Austrian National Bank has been defined as legal tender. Hungary agreed not to build a bank to compete. The Austrian National Bank was renamed the Austro-Hungarian National Bank in 1878, which became a genuine federal institution. Both countries within the Empire adopted the crown as a common currency, also accepted by other nations like Croatia, Poland or Romania too. This union proves the trust both states put in each other and their mutual power and influence.

It now seems relevant to study the report stemming from the implementation of these monetary unions, in order to evaluate them, discuss what has been correctly done and what has not. Then, we will focus on their failures to understand what led to their dissolution.

6. *Evaluation of the XIXth century monetary unions*

As we have seen, the German monetary union played a crucial part in the unification of Germany, which is its most positive impact. It increased confidence of the population which recognized a national power and more stability. Plus, it improved regional development by enriching them because of the opening and closing of markets. The Zollverein had therefore a rather positive impact in Germany. The industry soaring was reinforced by all the revenues of the German Union, and the country was then able to modernize tis infrastructures and build new ones. Indeed, the finances used for many industrial reforms and plans came mainly from these revenues.

However, these benefits are counterbalanced by some aspects which were not handled efficiently enough. Firstly, the Zollverein has been victim of conflicts opposing states within it, like the Austro-Prussian War in 1866 which is the logical result of a long-term rivalry between Austria and Prussia, to cite only one. This monetary union consisted more in a political attempt to unify the country more than a genuine alliance of states. It is said that many states entered the customs union for fiscal reasons only, leaving behind the contemporary vision of what a monetary union is which goes beyond this purely profitable concept (ensuring peace and widening trades for instance). Indeed, the small states had now the possibility to trade within much broader boundaries.

Besides, these conflicts were enhanced by tensions due to divergences in the expected interests among the members. In the end, the German Empire became the Weimar Republic in 1919 after World War I, which induced that no Union was needed anymore, Germany being fully unified. Luxemburg left the Zollverein at that moment. Therefore, the closure of this Union was neither harsh nor due to mistakes. The organization of the country and the political context were the true reasons.

The Latin monetary union is the one out of the three which lasted the longest. Yet, it is not considered a success, as no actual effects on trade were observed apart from the 1865-1874 period. The main problems this alliance encountered were related to this silver and gold situation. Their relative values fluctuated a lot which stressed the currency union. This is the major risk of a bimetallism union. At the foundation of the Latin monetary union, silver was at the end of a period of high valuation compared to gold. In 1873, its value fell, making the minting of silver in exchange for gold very interesting. Yet, countries feared the increase of silver coins in circulation and so agreed in Paris in 1874 to limit the free conversion of silver for a while.

In 1878, the minting of silver coins has been stopped, and they have then been removed from the circulation. Therefore, as soon as 1873, the Latin monetary union was considered a gold standard union, and logically not a bimetallism one anymore. Later on, the Union was still going mainly because leaving it would induce a forced redemption of the silver coins still in circulation, so the situation and the intentions were not even sane anymore, along with the will of some members to exploit a bit the weaknesses of the Union to serve their own interests.

Eventually, in spite of these major problems, the failure of the Union was a lot due to World War I (just like the German monetary union), during which Gold Standard was suspended within the international monetary system. Still, the Latin monetary union can easily be seen as the first attempt of a European monetary union and the ancestor of the present one.

The Scandinavian monetary union was largely inspired by the Latin one. This Union can be considered a success for some reasons and not really one for others. In the first place, it provided fixed exchange rates and a monetary stability. Between 1901 and 1905, it was a complete and efficient system of coin, banknotes and common drawing rights between the three central banks. However, this period of time is really short compared to its forty-one years of existence.

Besides, it was efficient specifically inside the Union but did not have a great foreign impact outside of it. The trades between the members were not significant at all, they represented a very small part of their total trades, and this part only kept decreasing and decreasing throughout the years. Moreover, the three countries lacked economic convergence, meaning that they neither had not reached a similar level of development within the Union.

Consequently, this Union did not fundamentally change the monetary system within it and even less within Europe. Moreover, there were great economic disparities between these three countries, no central bank and no sovereign entity to set interest rates.

In addition, the political union between Sweden and Norway was closed in 1905, though it did not really affect the cooperation within the Union. Finally, like the previous ones, World War I led to the dismantling of the Scandinavian monetary union, when Sweden broke up the tie to gold, implying a loss of fixed exchange rate, thus ending the free circulation between the members.

Lastly, the Austro-Hungary Union main issue and mistake was about the nature of the institutional structures. Austria really needed this alliance with Hungary, so Hungary had a lot influence in this Union. There was a clear threat of exit, so Hungary had a specific power within the central bank. Therefore, no perfect equality was noticeable. This relationship implied a lack of coordination and cooperation because there was a blackmail from Hungary. However, apart from this, the Union seemed quite stable, to the point it is believed that without World War I, it would certainly have developed positively.

As a result, we can affirm that these first efforts to facilitate the economies by starting a monetary union have not been evident successes. None of the three did bear or survive to World War I and its terrible economic impacts.

Although a lot of good is to be extracted from them, some mistakes and lack of true alliance feeling have many of the present monetary unions used them as templates to learn from them, in order to avoid making the same past mistakes and to launch more efficient ones.

C) Contemporary monetary unions: improvements, mistakes and lessons

Even though the few previous examples from the XIXth century were quite close to it, none of them were monetary unions as such because they did not combine every feature defining a true monetary union. As they were the first monetary alliances, this seems quite understandable. This is why the modern monetary unions learned from these past mistakes and tried to avoid them in order to be as efficient and beneficial as possible.

The main goals of our modern monetary unions are to help reducing transaction cost and increasing price transparency and market efficiency, whereas they were quite different for the four we have studied. For this subsection, we will focus on three examples of contemporary monetary unions, which can more easily be called zones: the eurozone, the dollar zone and the franc zone.

The sterling area is also an interesting example to study as it included around 50 countries among which the United Kingdom, India, Australia, Ireland; but it no longer exists since the fall of the British Empire during the 1970s, and this subsection subject might seem more relevant if studying monetary unions which are still existing nowadays. We will start by presenting them and understanding their origins, then we will talk about what lessons should have been learned from the historical examples, before evaluating one of the three unions to see what has been improved or not.

1. *Presentation of the European monetary union*

This is the major example of monetary union that ever existed. Its history is very long but extremely interesting. It covers both economic and political factors and definitely proves that establishing a monetary union is a complex and challenging process. Founded on the 7th of February 1992 with the Maastricht Treaties, the European monetary union formation dates way back. As we have seen, the Latin Union itself corresponds to the first attempt of a monetary union between European countries. The creation of the Union results from a very long and harsh process.

First, on the 23rd of July 1952, after the signature of the Treaty of Paris, the European Coal and Steel Community is formed by six European countries: Italy, Belgium, West Germany, France, the Netherlands and Luxembourg. This first treaty is aiming at creating a common market for coal and steel among the members, in order to avoid competition between each other over the natural resources, again demonstrating the social and political importance of these official agreements. It has definitely established the foundations of the European monetary union.

On the 25th of March 1957, the European Economic Community is finally formed after the signature of the Treaty of Rome by the same six countries. This treaty creates a customs union and sets a common market of goods, workers and capital between the members.

Later, the six members are joined by Denmark, the United Kingdom and Ireland in 1973, then Greece in 1981, and Portugal and Spain in 1986. The shape of the European monetary union starts to be plainly observable. It is finally with the Treaty of Maastricht that the European monetary union is created. Signed in February 1992 by eleven countries, it enters into force on the 1st of November 1993 and sets convergence criteria on inflation, public finances, interest rates and exchange rate stability, to limit the entries by non-developed countries.

The new currency is still not spread that year. The name “Euro” is adopted in 1995 and the Union commencement year is 1999 when the Euro becomes a real currency. The first banknotes and coins are introduced on the 1st of January 2002. The eleven first members of the Union are Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain. They are joined by Greece in 2001, Slovenia in 2007, Cyprus and Malta in 2008, Slovakia in 2009, Estonia in 2011, Latvia in 2014 and Lithuania in 2015. These are all the 19 official members of the European monetary union using the Euro as a currency. This must not be mistaken with the European Union, as many European Union members are not part of the European monetary union, like for instance the United Kingdom for instance as its currency is the pound and not the euro.

2. *Presentation of the dollar zone*

This zone was formed at the start of World War II and was then known as the dollar bloc. It is currently grouping several capitalist countries mainly from America whose monetary systems and foreign accounts are oriented to the US dollar. Though it was not formed by international agreements, it is fully defined and has a stable composition.

The United States of America were the original member until 1969, when it was then joined by many regions around the world, which are Bolivia, Venezuela, Haiti, Guatemala, Honduras, the Dominican Republic, Canada, Colombia, Costa Rica, Mexico, Nicaragua, Panama, El Salvador, Ecuador, the Philippines, Liberia, the American territory of Puerto Rico. It also included most of the Japanese islands which were under the United States control.

By then, 30% of the worldwide capitalist countries foreign trade were delivered to members of this currency zone. Despite being composed by around twenty members, the dollar zone is dominated by the United States, being the main supplier of finished products to the members and consuming the majority of the raw material resources. It owns the largest part of the capital invested and uses it to put political pressure on other members, whose foreign trade are oriented to the American market.

3. *Presentation of the franc zone*

Finally, the franc zone is a unique economic, monetary and cultural area leaded by France, resulting from several changes in the past French colonial Empire. It is therefore mainly composed by France's former colonial territories. In the French colonial Empire, which is dating back to the XIXth century, a monetary area was formed by pegging to the franc the currencies of the African territories within the Empire. However, the area reached a stable cohesion during World War II. The franc currency became inconvertible and a foreign exchange control was later implemented in 1939, which led to the foundation of an area sharing the same currency.

The franc zone became official with the Decrees of 1939, and the CFA (France's African colonies) and CFP (France's colonies in the Pacific) were created with the monetary reform from the 26th of December 1945. This zone has been described in 1950 as a "voluntary association", but it was still made on a colonial basis. Yet, even after the attainment of independence by France's former colonies between 1954 and 1962, the franc zone continued to exist.

Some countries who were previously members of the area (which are Algeria, Morocco and Tunisia) finally implemented their own national currency, foreign trade policies and national institutions as well. Later, members of this union formed their own unions within the franc zone, as the West African Economic and Monetary union founded in 1994 gathering Benin, Burkina Faso, Côte d'Ivoire, Guinea-Bissau, Niger, Senegal and Togo whose goal is to obtain larger regional integration. Another one is the Central African Economic and Monetary Community composed by Cameroon, Gabon, Chad, the Central African Republic, the Republic of Congo and Equatorial Guinea, founded in 1999, established to enhance cooperation and exchange among members.

The franc zone is nowadays made up of France and 15 African states: Benin, Burkina Faso, Côte d'Ivoire, Guinea Bissau, Mali, Niger, Senegal and Togo in West Africa, Cameroon, Central African Republic, Chad, Congo, Equatorial Guinea and Gabon in Central Africa and the Comoros Islands.

4. *Five lessons to extract from the early monetary unions*

Now that we have presented few of the most relevant present currency unions, it is entirely legitimate looking forward to establishing comparisons between those and the earlier ones. To do so, we will study the list of the five major points that have hopefully been included into the formation of the new monetary unions in order to improve their functioning.

First of all, the past monetary unions have proved the fragility of any monetary union. Indeed, arranging such unions requires great coordination, plus a favorable financial environment. These two criteria are often quite hard to obtain: the Latin monetary union, the Scandinavian monetary union, the Austro-Hungarian monetary union and the German Union all disappeared mainly because they lacked both those requirements, a lack even more emphasized with the beginning of World War I. Modern countries are aware of this fragility, leading to a better selection of the members.

The second one concerns the importance of economic convergence for viable monetary union. As we have seen, the best example representing that issue is the Scandinavian monetary union, in which there was very little economic convergence, putting pressure on the Union and finally leading to its dismantling.

The third difficulty to be managed by countries when forming a monetary union is about the importance of institutional safeguards. As seen with the Latin Union and the Scandinavian Union specifically, we can claim that a lack of safeguard can provoke many issues. The main one is the moral hazard: this means that one party did not enter the alliance in good faith, that it might take unusual risks due to the reliance upon the other members, or that some information has not been correctly transmitted. To prevent this, institutional safeguards are vital for the survival of a monetary union, by strengthening coordination between the members and preventing national interests, so that every member looks forward to serving the union interests first.

A fourth historical lesson taken into consideration is the relevance of national interests. Nowadays, the nation-state and the national governments have a new role as the notion of nationalism has drastically diminished in the last fifty years. Within the modern monetary unions, the countries must accept to deliver part of their sovereignty to the supranational institutions, so that the Union becomes as integrated as possible and that the international decisions are not blocked by nationalist visions.

The fifth and last lesson which has been thought about within modern monetary unions concerns the challenge of creating representative and strong centralized institutions. This is tough because those institutions absolutely need at the same time to be representative of the common interests of all members and to battle issues of moral hazard, which are tough challenges to overcome. For instance, Hungary used blackmail to put pressure on the Austro-Hungarian monetary union to extort favorable terms. This type of situation should never be seen again in any monetary union if it wants to be sustainable.

5. *Assessment of the European monetary union*

Having discussed what were the historical lessons for modern monetary unions to consider, we will now focus on the European monetary union case to study whether it has extracted the right lessons from the past examples and if it has improved or not by evaluating it.

The European Union has improved most of these mistakes done in the past. First, it has created a common monetary authority, the *European Central Bank*[4], which effectively controls the international policies. Then, to fight against the fragility of monetary unions, the European Union established convergence criteria with the Maastricht Treaty, officially signed on the 7th of February 1992, making the entry within the Union exclusive only for countries meeting these criteria verifying whether it has price stability, sound and sustainable public finances, sustainable convergence and exchange rate stability. These criteria are respectively measured by observing price inflation, government deficit and debt, long-term interest rate and exchange rate developments.

[4] *European Central Bank: the central bank for the euro, established in 1998 to administer monetary policy within the Eurozone and to manage the currency. Its main functions consist in setting the interest rates, handling foreign currency reserves, ensuring that financial markets and institutions are well supervised, and verifying the soundness of the European banking system.*

Moreover, the Union managed to input economic convergence, despite economic disparities existing amongst the members, which might explain how it survived the 2008 Great Recession. In addition to those, its ability to implement some strong centralized institutions (the European Council, the European Commission and the European Parliament for example) can, just like with the economic convergence, explain the success of the European Union to go through the 2008 financial crisis. Every member now serves the Union interests first, and they are fully coordinated. Some of the right lessons from early monetary unions apparently have been well extracted.

Nevertheless, the European Central Bank seems not truly able to fight against moral hazard: this is certainly due to the great differences in levels of power and influence existing among the member states, leading to the possible use of threats of exit by some members, for instance. Others can also put pressure in the Union thanks to their higher influence and power. Therefore, the European Union is obviously still incomplete, and its current institutional structure proves not to be able to recover entirely from large economic problems, like the Greek crisis.

Regarding Mundell's optimum currency area, the European Union seems far from it. There exists economic diversity and the labor markets are not flexible, which are the biggest obstacles for the states, henceforth not fully benefiting from the Union advantages.

Moreover, the European sovereign debt crisis of 2009-2015 can be considered a proof of the failure of the Union to satisfy the Mundell's four criteria, mainly because of the use of the Article 103 "no-bailout policy" clause which appeared to be unsustainable. This clause says that "the Union shall not be liable for or assume the commitments of central governments", meaning that any member can bailout another one if it wants but without any legal basis. This occurred in the case of the Greek financial crisis, and in the end the Eurogroup did not manage to find a definitive solution to solve Greece debt issue.

To conclude, throughout this subsection, we have been presenting the major monetary unions and currency zones. We have seen what mistakes had been done within the XIXth century ones, concerning mostly the fragility of these monetary unions, highlighted by the use of blackmail, the existence of weak institutions and the presence of moral hazard. We then have finally assessed the European monetary union to see whether improvements are to be seen or not, and concluded that it looks as if this challenge has in general been overcame, though there are still some aspects to be improved in order to reach a perfect and complete monetary union.

CHAPTER 2: REDENOMINATION

A) Definition

Redenomination is the name given to the process whereby a country's currency is recalibrated due to significant inflation and currency devaluation, or when a country adopts a new currency and needs to exchange the old currency for a new one at a fixed rate. Redenominating is exchanging old currency for new currency or changing the face value of existing notes or coins in circulation. It should happen when the value of a currency is revalued or recalibrated due to a substantial change in the buying power of the currency, or when a country joins (or leaves) a monetary union where one currency needs to be revalued as another one. It is also the case when a new currency is created at the same time as the monetary union is.

Redenomination should occur for economic reasons: high level of inflation that provokes a loss of value of the currency, a lack of competitiveness that requires a depreciation of the currency to restore the market shares, build-up of excessive debts which can led to a loss of the financial markets confidence and default, lack of exchanges reserves to guarantee a fixed exchange rate.

Redenomination can also occur for political reasons: a disintegration of a country after wars for instance, a return to the former currency for nationalistic feelings, to symbolize a recent independence and the new sovereignty.

In the case of hyperinflation, situation in which prices rise extremely fast in general when the monthly inflation rate reaches over 50% (the rate is the evolution of prices compared to a previous period), old notes are replaced with new as they become of little utility to buy more expensive products. After redenomination, old notes may circulate for a time but are usually exchanged for the new redenominated currency.

The most famous example of such a situation is the monetary crisis of Weimar Republic in 1923, when the monthly inflation rate reached its peak by October 1923 at 29,500%. The Weimar Republic was struggling with reparations payments due to its defeat at World War I and the Ruhr occupation by France. The debt increased dramatically, and the government decided to create the money needed.

To illustrate this point, we can highlight the fact that the price of bread increased from 1 mark per loaf in 1919 to 200,000 billion marks in 1923. Furthermore, the meal prices served in the restaurants even varied depending on the time of order, so that the restaurant owners charged the bill at the beginning of the meals, and finally the workers in the factories were paid twice a day so that they could spend their wages as soon as they received them.

A redenomination occurred in November 1923: the Rentenmark was issued as a transition currency based on industrial and agricultural wealth to fight against hyperinflation between 1923 and 1948, and from 1924 two currencies (the Reichsmark and the Rentenmark) were in circulation. The mark had lost all value. To symbolize and remember this traumatic memory for the German people, a commemorative medal was created *(see Figure 1)*.

Figure 1: Commemorative medal of 1923 hyperinflation.
"1 pound of bread = 3 billion; 1 pound of meat = 36 billion; 1 pint of beer = 4 billion".

This episode of hyperinflation and the following redenomination, even if it is far from us nowadays, explains why Germany pays so much attention to avoid inflation, accepting with reluctance, and solely in very particular situations, to pursue an accommodative monetary policy, like the quantitative easing that was set after the financial crisis of 2008.

When hyperinflation is involved, the redenomination becomes an absolute necessity because it then requires too many old banknotes to facilitate commerce effectively. For example, in Zimbabwe in 2008, the inflation is officially estimated to be around 231,000,000% per year, so the small bills formerly available become essentially useless if it requires a truckload of them to buy a loaf of bread which may cost 5,000,000 Zimbabwean dollars.

While inflation is the main cause behind a country redenominating its currency, decimalization and monetary unions are also forms of redenomination. When redenomination occurs, old banknotes and coins are typically taken out of circulation or have a fixed value against new notes which have the recalibrated value. A new value is established for new banknotes/coins based on the old notes.

When countries join a monetary union, like the eurozone for instance, the redenomination of every member currency is mandatory because they start using a currency like the euro instead of their own. When the euro was introduced in 1999, all the countries who decided to adopt it had to change their currency from a local one to the euro. This process is in effect a denomination, because the value of the country's banknotes is therefore changing. To cite one example, the Irish pound was converted to euros at a rate which was evaluated at 0.787564 pounds per euro.

Initially, 11 countries adopted the euro in 1999, it was in circulation in January 2002 for the first time, with the largest currencies taken out of circulation being the Deutsche mark, the Spanish peseta, and the French franc. In 2019, there are 19 nations using the euro as the national currency, with Lithuania being added in 2015 which exchanged Lithuanian litas for the euro.

B) Who can decide the redenomination?

The monetary sovereignty includes essentially three exclusive rights for a given state: the right to issue currency, that is, coins and banknotes that are legal tender within its territory; the right to determine and change the value of that currency, and the right to regulate the use of that currency or any other within its territory. As a consequence, the government, especially the Prime Minister, the Finance Minister, the Central Bank Governor and other key officials, should decide, meet and discuss on how to redenominate the currency.

The Prime Minister should inform partners if they are some: in the eurozone for example, including the European Commission and the ECB, whose cooperation will be essential in minimizing the negative effects on the financial markets. The government must redenominate its debt in the new national currency and make clear its intention to renegotiate the terms of this debt. All the countries which lent money to the exiter are very careful about the repay of their loans and are very interested in the currency choice, particularly if they anticipate a currency depreciation. In most cases, this will involve a substantial default risk, the redenomination risk is often included in the risk premium of the debt rates nowadays as we will see later. But the government should also make clear its intention to service its remaining debt as soon as practically possible. Depending on the country circumstances, the government should also consider redenominating private sector debt, with agreement from the creditor governments. That is why the major international organizations, such as the IMF (International Monetary Fund) and the world's major central banks, should also be warned so that they can stand ready to support the global financial system (for example by injections of large amounts of liquidity if there is a risk of panic).

C) The principles on which a redenomination is based

It is legitimate to ask the principles on which is based a redenomination. An issue is to determine the legal status of new currency and its impact on contracts originally specified in the former one.

The most useful starting point is the principle of "lex monetae", which states that everything which governs the currency of a country can legally be determined by the national government concerned. This is a universal principle of international law which applies to all references to a national currency (including for private as well as public debt) and to all jurisdictions (local and foreign). Thus, for example if a government changes its national currency from the lira to the euro, any lira amounts specified in any contract will automatically be redenominated into euro using the conversion rate specified by the government. Furthermore, this would be legally valid even if it imposes substantial losses on one party or the other.

We must point out that a redenomination of a currency of a single country without monetary union or partners defines generally a new currency linked with the former one. In the case of a monetary union, the new currency is sometimes the existing currency in the country before the creation of the monetary union or a new currency not related to the monetary union members former currencies.

The choice of linking the redenominated currency to a fixed or variable exchange rate system depends on the country, its economic characteristics, the period, its partners, and so on. The financial situation of the country is obviously very important for choosing the exchange rate system, a country with weak currency reserves would not be able to choose a fixed exchange rate system because it may require intervention by the central bank to control the exchange rate. This control means to hold large currency reserves.

A debt expressed in the currency of another country involves an obligation to pay the nominal amount of the debt: the lex monetae principle generally applies to the determination of the applicable currency of monetary obligations under a contract.

For example, if a Greek borrower entered into a single currency loan agreement denominated in pounds sterling governed by German law, questions regarding the currency of account would be determined under English law, not German law. So, if under English law, the currency of the UK was changed from pounds sterling to US dollars, US dollars would be the currency applicable to the loan agreement.

When a state decides to change its national currency, it is necessary for the relevant legislation to prescribe the exchange rate, or "recurrent link" between the old currency and the new currency. An important point is to clearly distinguish between the "money of account" which is the currency in which the nominal amount of an obligation is to be calculated and the "money of payment", which is the currency in which the obligation is payable. They may be different: if the currency in which the nominal amount of the obligation is to be calculated, i.e. the currency of account, is pounds sterling but the loan agreement provides that payment may be made in New York, the obligation may be discharged in New York by payment of the US dollar amount equivalent to the pounds sterling obligation. The lex monetae deals with the currency in which the nominal amount of an obligation is to be calculated.

In fact, the application of the lex monetae principle is relatively simple for currencies used by only one country. Taking the above example, the reference in the loan agreement to pounds sterling results in the application of English law as the lex monetae. For instance, in the case of the eurozone, the euro is not the currency of a single country because there are 19 members in the eurozone, and it is the EU law that is applicable to the euro. Accordingly, in the case of some obligations denominated in euro, the question is likely to arise as to whether the lex monetae is the relevant law of the EU, or the law of one of the European Union members.

Moreover, the determination of the lex monetae question will depend on the court to which the question is submitted, and the issue of jurisdiction is a very important one concerning this point. The lex monetae should be determined by interpreting the relevant contract in accordance with the law applicable to that contract. Generally, the relevant one is to be determined by reference to the intention of the parties at the time they entered into the contract. The intention of the parties may well need to be inferred. As is obvious from the above, there is a difference between the governing law of an agreement and the lex monetae applicable to monetary obligations under that agreement. The governing law is likely to be specified, but the lex monetae will certainly not be. The court having jurisdiction will depend on applicable law and the terms of the contract.

Supporters of the French Franc comeback, like Marine Le Pen from the Front National, estimate that an exit from the euro would not induce major legal problems under the monetary principle known as the lex monetae. But redenomination means leaving the eurozone in this case and that means dealing with the eurozone partners, including many negotiations: the process should represent a long path. Marine Le Pen seems not to take in account all these constraints and highlights only the possible benefits of a redenomination in case of a eurozone exit, that is to say the decrease in price exports and the benefits on significant French trade deficits. According to this principle, defining the regime of money is an alleged attribute of any sovereign state. Therefore, when the latter decides to change the currency, this change applies ipso facto to all the rights and financial obligations that arise from contracts in force, except in the case where the latter contain stipulations to the contrary.

The redenomination of euro-denominated contracts for example poses a particular problem for debt contracts and, in particular, public debt, since a sharp depreciation of the new local currency is unanticipated. If the contracts remain denominated in euros, the debt expense would increase due to the proportion of the depreciation. If they are converted into a local currency, the debt burden would not be increased for the debtor, but this would result in a loss for the creditors. When the euro was introduced, redenomination of the currency in the contracts actually occurred under the lex monetae without major difficulties for the countries that joined the eurozone. However, the reverse process would be much more complex and perilous, not only economically and financially, but also legally.

The redenomination could only occur after a very long institutional and legal process. The choice for the present contracts the day of the euro zone departure would probably depend on few criteria, which we are going to list now.

The main one would be first the legal regime applicable to the contracts. Contracts can specify what legal regime is applicable to them and what are the competent courts. These clauses generally appear within international contracts, including intra-European ones. Between two parties of a same country and without special stipulation, the legal regime applicable to the parties is the one from the residential country. If a contract between two parties of a same country foresees the application of a foreign legal regime, the courts of the residential country will declare themselves competent and apply the local right with a high probability. The second one is the intention of the parties: it can be expressed by the choice of the legal regime but also within other contract clauses. The third one is the location of the payment: if it occurs in the country leaving the euro zone, this would strengthen the application presumption of the lex monetae of that country. Finally, the fourth and last one is that the sovereign debt is presumed (except if contrary stipulation) to fall under the lex monetae of the issuing country.

These criteria seem to be applicable to all the monetary unions and could be discussed because the monetary unions generally do not provide the detailed rules for a member exit in their treaties. In any case, the location of the courts that would have to decide disputes over the choice of currency can influence the decision. The courts of the departing country would certainly be more inclined to apply the legal regime of the latter and to decide in favor of redenomination than the foreign courts. The latter, in the absence of any specific stipulation of the contracts, could consider that the outgoing country having engaged in an "irrevocable" monetary union (Article 140 (3) of the Treaty on the Functioning of the European Union) is the lex monetae of the remaining countries within the prevailing union. We can sum up the likely results about contracts in the following Table 1.

Legal status of contracts and location of parties	Most likely solution
1. Contracts in euro between residents of the outgoing country under the legal regime of the latter	Redenomination in the new currency of the outgoing country
2. Contracts in euro between residents of the outgoing country and non-residents under the regime of a foreign law	Redenomination in the new currency of the outgoing country, except other interpretation by the courts
3. Contracts in euro between residents and non-residents under the regime of a foreign law	Maintenance of the monetary union currency
4. Contracts in euro between residents under the regime of a foreign law	High probability of redenomination in the new currency of the outgoing country

Table 1: Contracts and currency redenomination

A last important issue concerns the exit bonus. It is generally constituted of debt or loan (more rarely) of the central bank of the outgoing country to the central banks of the remaining countries in a monetary union. It is not therefore the debt of the outgoing government, but only central bank debt, which can also reach very high amounts, and in particular in the case of Greece for the eurozone.

The principle is the following: the bonus is the common currency that has been put into circulation by the central bank of the outgoing country during its time of presence in the monetary union and which escape the redenomination in new national currency. There are two possibilities to escape: liquid withdrawals, since withdrawn notes can be hoarded or sent abroad, and bank transfers made abroad.

Although there are also other more technical components of the exit bonus, which are linked for example to the IMF or the ECB's equity investment, they are negligible and have no impact on the order of size of the exit bonus.

Consider first the case of the notes, which is the most difficult. A central bank circulates tickets "at its ticket counters", which may also mean that it delivers to the commercial banks money to fill their ATMs. But it also gets out of circulation, so what matters is the net balance. Apart from the case of monetary union, this net balance is of course always positive; in the case of the monetary union, it may occur -for brief periods and for small neighboring countries of a larger one- that it is negative.

This balance is the cause and origin of the component due to the exit premium notes, since the notes in circulation cannot be taken back by force and it is not possible to "demonetize them at a different time". Especially for practical reasons, because how could one track down all the notes identified as issued by the outgoing country among all the traders and households of the world? As a result, outstanding banknotes (banknotes in circulation) are not eligible for redenomination in national currency.

D) Different types of redenomination

Of course, we must notice that the redenomination process is much easier when the country which wants to redenominate does not belong to a monetary union. When this country has no constraints linked to a monetary union with other members, it can decide alone how to manage its redenomination because of economic or political reasons. The process is obviously more complex and long when the redenomination means leaving a monetary union dealing with many economic partners. A redenomination for one country can lead to major changes for the partners or even to a disintegration of the monetary union. In the case of a country fragmentation, we will see that countries emerging from the former one often make the choice to redenominate their former currencies to endorse the fragmentation and symbolize their new independence.

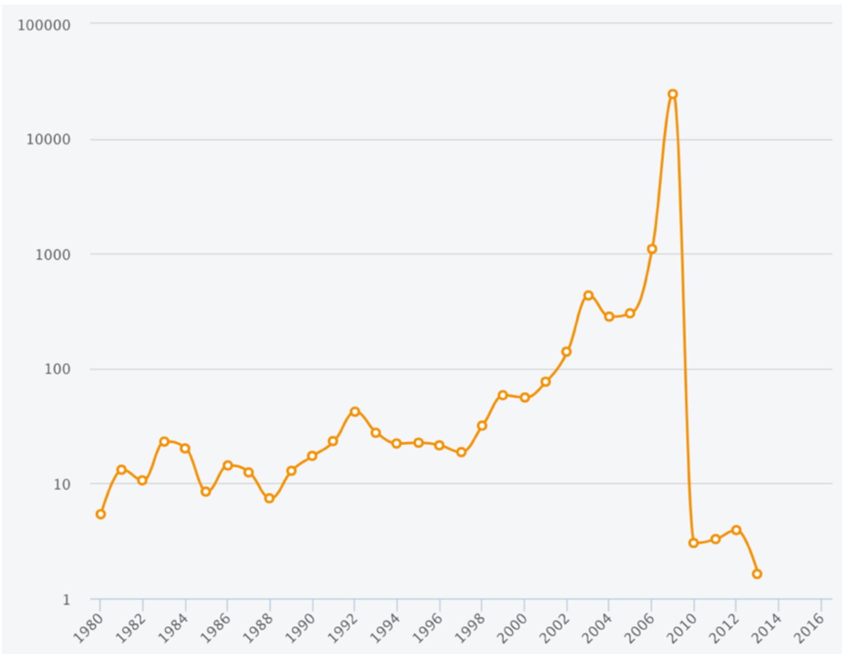
1. *Redenomination without monetary union*

The governments of countries that do not belong to a monetary union can take the decision to redenominate their currency for different reasons, but one of the most important one has always been inflation or hyperinflation. When prices rise too much and a fortiori if a hyperinflation situation develops, governments use redenomination to deal with it because the money becomes useless.

One of the most famous examples of redenomination due to hyperinflation concerns Zimbabwe and the Zimbabwean dollar. From the beginning of the XXth century, Zimbabwe experienced many periods of hyperinflation where prices rose by extremely high levels. The inflation rate was so high that the government even chose not to publish it to prevent a deeper economical and financial crisis with loss of confidence, deposit runs and finally cause a domino effect.

Many redenominations occurred within a few years, starting in 2006, because hyperinflation destroyed Zimbabwean dollar’s value. In 2008, the inflation rate was officially estimated to 231,000,000% per year, so the small bills formerly available become essentially useless if it requires a truckload of them to buy a loaf of bread which may cost 5,000,000 Zimbabwean dollars. Furthermore, all the US dollars were leaving the country and the flight of capital was uncontrollable. To highlight this critical situation, it is to be known that 1,000 old dollars (ZWD) could be exchanged for only one new dollar (ZWN). As a result, the second redenomination was decided: 10 billion ZWN could be exchanged for one dollar of the new currency (ZWR). At this time, foreign currencies began to be widely accepted and sometimes required, to buy goods since retailers and businesses preferred receiving more stable US dollars (or other widely used currencies) or the South African rand, over ZWR. As inflation went on, the country printed larger and larger banknotes, with ten zeros being added by late 2008 *(see graph 1 below)*.

In 2009, a third redenomination occurred, with one trillion ZWR being exchanged for one dollar of the new currency (ZWL). The reserve bank printed notes worth 100 trillion Zimbabwe dollars but all the US dollars were leaving the country, the prices were doubling every day and people were used to do long bank queues to get their money. By 2009 the US dollar was the primary currency used in the country, and the Zimbabwe dollar mostly stopped circulating. It was the weakest currency in the world and the government decided finally to give up the use of Zimbabwean dollar for one year, but it was still not used at the beginning of 2015. In 2016, new Zimbabwe dollars are indexed on US dollars, and in February 2019, the fixed parity with US dollar is cancelled and the new currency is now called RTGS (Real Time Gross Settlement) dollar or zollar. Despite these redenominations, the inflation did not disappear in Zimbabwe even if hyperinflation did and ZWL went on losing its purchasing power.



Graph 1: Inflation rates in Zimbabwe from 1980 to 2016. X-axis = years, Y-axis = rate of inflation. Source: World Bank

Another major example concerns the Hungarian Kingdom between 1919 and 1946: it was affected by the most important hyperinflation in the economic history. The Hungarian kronen was created in 1921 and was replaced in 1927 by a new currency called pengö (1 pengö = 12.500 kronen) until 1946. During the year 1946, the inflation rate could rise 50% a day and some multiples had to be added to the pengö: the milpengö created in April was worth 1 million pengös, in June the billopengö was worth billion billion pengös, and in July the pengö was replaced by the adopengö.

Similarly, in 1952 in Bulgaria, the post-war inflation was so high that the communist authorities decided a first redenomination: a new lev was worth 100 formers lev. A second redenomination in 1962 was decided because of the continuous inflation and the new lev was worth 10 formers ones.

In addition, political factors can also lead to a currency redenomination. As soon as he arrived at the head of the French Republic in 1958, General de Gaulle wanted to create a new currency with the new fifth Republic. This franc was supposed to symbolize a new era and the close attention paid to the stability of the currency by the new government. It was imagined in 1958 and implemented in the economy in 1960: a new franc was worth 100 old francs.

2. *Redenomination in the case of a monetary union*

First, it is important to notice that the redenomination occurs only when the monetary union implies the issuing of a single common currency for all the members. As seen, some monetary unions, like the Latin Union during the XIXth century, were not based on a common currency. Each country had its own currency, and the currencies were only linked because they were pegged to gold or silver at the same rate.

In the case of monetary unions with a common currency issued, the process of the redenomination of a currency occurs when a country joins the monetary union and when it wants to exit the monetary union. In the case of joining a monetary union, the redenomination process implies first a waiver of the national currency issuing and its unlimited withholding power in favor of the new common currency, then a strengthening of the power of the new currency obtained by the credibility of partners who play a reference role, like Germany for the euro, also an inflation control and the security it creates for foreign capital flow entrance, as well as an interest rate level decrease, and as a result an easier credit grant and a rise in the bonds value, and finally a greater ability to repay the public and private debt. When countries want to join a monetary union, the process of the redenomination seems easy. For example, it is to be reminded that the redenomination of all the former currencies of the members of the eurozone occurred successfully with no problems or disruption.

The redenomination of the currency in the public or private contracts of all the members, in application of the lex monetae, has been quickly and efficiently achieved. However, it is crucial to remember that countries which were allowed to join euro had to fulfill the five convergence criteria of Maastricht treaty in 1992, according to the governor of the Central Bank of Indonesia, Darmin Nasution, "to make redenomination success the most important things are low inflation rate, stable economic growth, guarantee of price stability and good socialization to the society". As a matter of fact, the redenomination was implemented in Indonesia in 2010 successfully: the rupiah was redenominated up to three zeros.

On the contrary, the redenomination of a currency that happens when a country member of a monetary union decides to leave is supposed to be more difficult at first sight. Of course, the complexity of legislative and institutional details of a redenomination depends on the treaties of the monetary unions. The rules may differ significantly from one monetary union to the other. The redenomination following an exit of the monetary union allows countries to be able to use directly the monetary policy when needed, to fight against recession the central bank can issue money (in particular to finance public deficit or firms), to act directly on the real exchange rate by devaluating the nominal exchange rate in order to improve the trade deficit, to accept inflation and interest rates increases periods to stimulate the economy when necessary, and finally to finance large industrial projects without using ex ante savings.

According to a study made by Andrew Rose in 2007, 69 cases of monetary union exits are collected from World war II, the majority of these cases concerns countries which have left a monetary union because of the decolonization process that gave them political independence. The following table sums up all the exits over 130 countries from 1946 to 2005.

Country	**Year**	**Anchor**
Algeria	1969	France
Angola	1976	Portugal
Bahrain	1973	India
Bangladesh	1965	India
Barbados	1975	ECCA
Botswana	1977	S Africa
Burundi	1964	Belgium
Cape Verde	1977	Portugal
Caymans	1972	Jamaica
Comoros	1994	CFA
Cuba	1950	USA
Cyprus	1972	UK
Djibouti	1949	CFA
Dominican Rep	1985	USA
Equatorial Guinea	1969	Spain
Gambia	1971	UK
Ghana	1965	UK
Guatemala	1986	USA
Guinea	1969	CFA
Guinea-Bissau	1976	Portugal
Guyana	1971	ECCA
Iraq	1967	UK
Ireland	1979	UK
Israel	1954	UK
Jamaica	1954	UK
Jordan	1967	UK
Kenya	1978	EACB
Kuwait	1967	UK
Libya	1967	UK
Madagascar	1982	CFA
Malawi	1971	CACB
Maldives	1967	India
Mali	1962	CFA
Malta	1971	UK
Mauritania	1973	CFA
Mauritius	1967	India
Morocco	1959	France
Mozambique	1977	Portugal
Myanmar (Burma)	1967	India
New Zealand	1967	UK
Nigeria	1967	UK
Oman	1975	UK
Pakistan	1949	UK
Qatar	1959	India
Reunion	1976	CFA
Rwanda	1966	Belgium
Sao Tome and Principe	1977	Portugal
Seychelles	1967	India
Sierra Leone	1965	UK
Singapore	1967	UK
Solomon Islands	1979	Australia
Somalia	1971	EACB
South Africa	1961	UK
South Yemen	1972	EACB
Sri Lanka	1966	India
St. Pierre and Miquelon	1976	CFA
Sudan	1956	Egypt
Suriname	1994	Neth. Ant.
Tanzania	1978	EACB
Tonga	1991	Australia
Trinidad & Tobago	1976	ECCA
Tunisia	1958	France
Uganda	1978	EACB
Vanuatu	1981	CFP
Western Samoa	1967	NZ
Yemen, North	1971	EACB
Zaire	1961	Belgium
Zambia	1971	CACB
Zimbabwe	1971	CACB

Table 2: Departures from currency unions

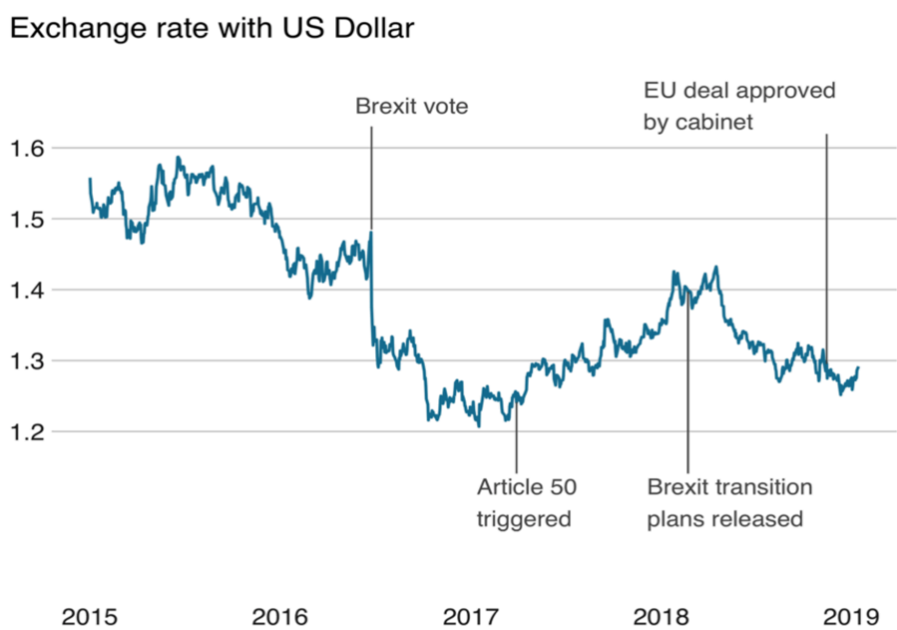
Source: Checking Out: Exits from Currency Unions Andrew K. Rose, 2007

This study surprisingly concludes that “most exits from a currency union have been associated with low macroeconomic volatility and that currency breakups are common and can be achieved quickly”. However, it is important to point out that nowadays the capital markets are globalized, the capital mobility is higher than before, and the financial markets are undoubtedly very volatile. Therefore, it is reasonable to think that a currency breakup concerning a major country could be difficult for itself and the other members of the monetary unions. These difficulties could be made worse if the origin of the exit is due to a too high public debt burden that could lead to default. The case of Greece emphasizes the difficulty to leave a monetary union if the country must redenominate its debt in a devaluated currency, it could definitely be unable to repay it.

In the case of the eurozone, some members of the European union are allowed to not participate to the monetary union (England, Denmark), but the European treaties do not consider the case of the exit of a member of the eurozone without leaving the European union at the same time, the redenomination process is not really considered in the treaty. So, the redenomination issues raised, as we saw before, relating to the contracts and the choice of the lex monetae should be addressed.

Another example concerns the CFA franc zone, it is constituted of 15 African countries which forms the ECOWAS (Economic Community of West African States), 8 of them use the CFA franc with a fixed parity with the euro guaranteed by France. For 20 years, they have been discussed about the creation of a new currency called ECO, this new currency intended to be launched in 2000, should be finally formally adopted in 2020 by 15 west African countries. These African countries have fixed convergence criteria about inflation, budgetary deficit and only those that reach the criteria will be accepted in the Union.

Finally, we must underline that the case of the Brexit of the United Kingdom from the European Union will not lead to a process of redenomination because it does not imply for the UK to redenominate its currency: in fact it does not belong to the eurozone but just to the European Union and does not share the common currency with the other members. However, it does not mean that Brexit had not and will not affect the pound: the graph 2 below highlights the fact that the pound has suffered from the referendum in 2016 about Brexit, it evolves correlatively to the evolution of the type of Brexit, if it is expected to be hard or soft. In any case, we can think that the pound will decrease if a hard Brexit is implemented and if the English economic situation will deteriorate in the future, but this is not the Brexit by itself that imposes a redenomination of the pound.



Graph 2: Pound performance since the European Union referendum

Source: Bloomberg

3. *Redenomination following a country's fragmentation*

The best example of a recent country's fragmentation concerns the former Socialist Federal Republic of Yugoslavia, republic proclaimed in 1963, federation of six states: Bosnia and Herzegovina, Croatia, Macedonia, Montenegro, Slovenia and Serbia.

Between 1991 and 2008, civil wars have led to the outbreak of the country, and today the Yugoslavia Republic has disappeared in favor of the six old states and the Kosovo partially recognized internationally. The currency of former Yugoslavia was the Yugoslavian dinar created in 1920 and the most used currency until 2003 in the region. From 1992, other currencies gradually replaced the Yugoslavian dinar which was officially devalued 18 times since 1991. It was redenominated in December 1992: nine zeros were lopped off in the third redenomination since the month of July.

In January 1994, the monthly inflation rate reaches 313.000.000%. The dinar officially collapsed in 1994 due to the second-highest and second-longest hyperinflation in the world history and the government declared that the new dinar with a value ratio of 1 with the Deutsch mark. It was henceforth the legal currency for payment of all financial transactions in Yugoslavia. The "bogus super dinar system" effectively ended this period of hyperinflation. Finally, four of the six new republics issued their own currency as soon as they declared their independence as the table 3 points out.

Country	Currency	Date of adoption	Value
Slovenia	Slovenian tolar	8 October 1991	1 Yugoslav dinar of 1990
Macedonia	Macedonian denar	26 April 1992	1 Yugoslav dinar of 1990
Croatia	Croatian dinar	23 December 1991	1 Yugoslav dinar of 1990
Bosnia and Herzegovina	Bosnian dinar	1 July 1992	1 Yugoslav dinar of 1992

Table 3: New currencies in the countries of former Yugoslavia right after its breakup.

Source: Various searches.

Another example concerns the bursting of the Union of Soviet Socialist Republics at the end of 1991; it led to the creation of 15 legally independent state entities which quickly claimed the issuing of their own currency to assert their autonomy towards USSR and decided to not use anymore the Russian ruble: this is the starting point of the collapse of the ruble zone by the end of 1993.

For example, Estonia issued the kroon in 1992 before joining the eurozone in 2011, Lithuania issued its new currency in 1993, called litas, before adopting the euro currency in 2015, Azerbaijan issued the manat in 1994. The table 4 underlines that all the new countries created by the USSR split made the choice to issue a new currency.

Country	Month of Currency Introduction, Currency Name	Month of Pre-1993 Rubles Withdrawn	Month of New Currency Becoming the sole Legal Tender	Note
Estonia	June 1992, Kroon	June 1992	June 1992	
Latvia	May 1992, Latvian ruble (interim currency)	July 1992	July 1992	The Lats, a new national currency, was introduced in March 1993.
Lithuania	May 1992, Talonas (coupon)	October 1992	October 1992	The Litas, a new national currency, was introduced in June 1993.
Ukraine	November 1992, Karbovanets	November 1992	November 1992	The coupon system implemented on January 10, 1992, made coupons legal tender in state stores and confined the use of rubles to the payment of rent services, etc; and for the purchase of goods in "private" markets. The hryvnia was introduced in September 1996.
Kyrgyz Republic	May 1993, Som	May 1993	May 1993	
Moldova	June 1992, Moldovan coupon	July 1993	July 1993	The Moldovan coupon became a de facto national currency in July 1993; the Leu was introduced as sole legal tender in November 1993.
Russia	July 1993, 1993 Russian ruble	July-August 1993	July 1993	Pre-1993 rubles were converted at par to 1993 Russian rubles.
Georgia	April 1993, Georgian coupon	August 1993	August 1993	The Lari, a new national currency, was introduced in September 1995 and became sole legal tender in October 1995.
Belarus	May 1992, Belarussian rubel (coupon)	July 1993	September 1993	On 9/3/93, Belarus signed a bilateral monetary and economic unification agreement with Russia. The agreement stated the conversion of Belarussian into Russian rubles at par. A new agreement was signed on 4/12/94 replacing the 1:1 conversion factor with one linked to market developments.
Armenia	November 1993, Dram	November 1993	November 1993	Small denomination notes of the pre-1993 ruble remained legal tender on an interim basis until March 1994.
Kazakhstan	November 1993, Tenge	November 1993	November 1993	
Turkmenistan	November 1993, Manat	November 1993	November 1993	
Uzbekistan	November 1993, Sum coupon	November 1993	November 1993	The Sum was introduced in July 1994.
Azerbaijan	August 1992, Manat	July-August 1993	December 1993	Small denomination notes of the pre-1993 ruble remained in circulation until December 1993.
Tajikistan	May 1995, Tajik ruble	January 1994	May 1995	1993 Russian rubles were used as a legal tender between January 1994 and May 1995.

Table 4: New currencies of former USSR countries

Sources: Various International Monetary Fund economic reviews

CHAPTER 3: THE RISKS OF A REDENOMINATION AND HOW TO MEASURE THEM

A) The redenomination risks

The convertibility or redenomination risk is, according to Mario Draghi, former President of the European Central Bank "the compensation demanded by markets participants for the risk that a currency asset is redenominated into a devalued legal currency". It is possible to distinguish five risks associated to the redenomination risk.

1. *The monetary uncertainty*

When an outgoing country issues a new currency, the government would need to declare a conversion rate relative to the common one. When a conversion rate is defined, the risk is that the foreign exchange markets and the international investors would consider the rate does not represent the real economic performance of the country. They would be able in this case to depreciate or appreciate the new currency to a level they consider as appropriate. The anticipated depreciation due to the exchange rate adjustment for Italy would reach 30% in case of an eurozone exit for instance according to some studies, and the appreciation for Germany could be expected to 15%. Nevertheless, these simulations are estimations, and no one can predict the future exchange rate. Therefore, it is reasonable to think that a currency breakup concerning a major country could be difficult for itself and the other members of the monetary unions due to this uncertainty.

2. *The financial issue*

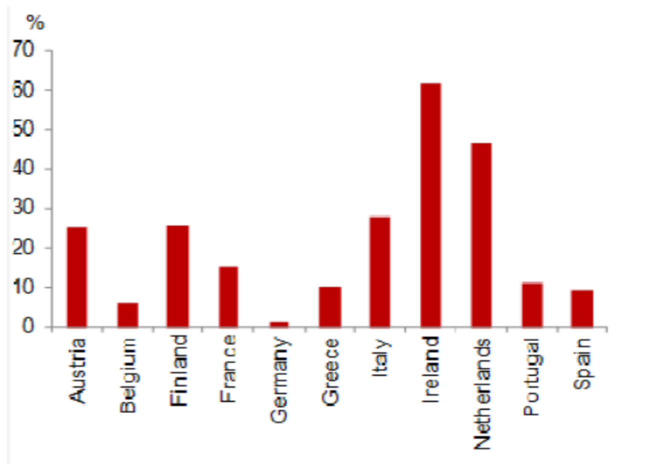
Redenomination can generate an important convertibility risk if citizens anticipate a devaluation of the new currency. The major one is the risk of capital flight because people want to invest their former currency abroad or keep it and need to withdraw it from the banks before it disappears. This behavior could emphasize the government's indebtedness after departure and worsen economic relationship with the remaining members of the monetary union and creditors as a whole. However, it is important to point out that nowadays the capital markets are globalized, the capital mobility is higher than before, and the financial markets are undoubtedly very volatile. Capital control can be needed as resident households and businesses forbidden from acquiring foreign assets, investing abroad, or holding bank accounts outside their own countries. A stringent capital control could be recommended when the economic situation of the outgoing country is economically fragile, but this is in any case a temporary action. These risks can create a financial system crisis with deposit runs (people do not have confidence in the financial system and want to withdraw their money from banks), credit crunch (banks are afraid to lend and contract credit granted) and domino effect (explains how a national economic problem can spread like a contagion to similar countries or firms). To prevent a banking collapse, citizens may not be allowed to withdraw money from banks and cash machines, by simply declaring a bank holiday for example.

3. <u>The debt issue</u>

In fact, the question is whether an obligation issued in the former currency should be paid in the former or the new currency converted at the official exchange rate. Devaluation likely happens after a redenomination, so the new currency would worth less than the former, meaning that if the country chooses to redenominate its public debt in the new currency, creditors will be repaid in the new currency whose value has fallen. Despite the fact that the country still services its debt, this redenomination could be considered a default for financial markets and it can be difficult for the country to borrow after this. It is sometimes better for the outgoing country to renegotiate its debt before leaving and redenominating its currency. The study of Andrew Rose in 2017 surprisingly concludes that, historically, “most exits from a currency union have been associated with low macroeconomic volatility and that currency breakups are common and can be achieved quickly”.

In the case of the eurozone, if Greece would leave, it should declare a conversion rate from euros into drachma, we can suppose that this conversion rate might integrate from the beginning a devaluation of the drachma due to the poor economic performance of Greece. In a way, it does not mean that it is a significant problem for Greece: a currency devaluation could mean more exports, but in another way, the country public debt would be more expensive and very difficult to repay in a devaluated currency.

The graph 3 states that for most of the eurozone countries local laws governs the huge majority issuance as a percentage of the total bonds issued (90% for Greece, Portugal and Spain). The countries issuing under local law likely should redenominate in the new currency they choose if they leave the eurozone and would not be obliged to repay in euro. Therefore, the redenomination risk is significant for Greece, Portugal and Spain. The countries with large foreign law issuance as a percentage of the total bonds issued are Ireland, Netherlands, Italy and France. For these countries the default risk on the public debt is more important than the redenomination risk because the debt is mainly issued in dollar.



Graph 3: Bonds under foreign law as a share of total bonds outstanding

Source: BIS, Bloomberg, Nomura

The redenomination of debt into a local currency may not appear immediately as a default to international investors but it should be considered a technical default by rating agencies like Standard and

Poor's and Moody's anyway. Indeed, would the Italy's creditors or Ireland ones accept a redenomination in local currencies by application of the lex monetae? It is difficult to know what would happen, anyway the Bank of England recommended to the financial institutions to incorporate an exit clause from the euro area in all their contracts in 2011 after the financial crisis of 2008.

The government of a leaving country should make very clear its intention to renegotiate the terms of its sovereign debt and inform it would service the debt immediately. Negotiating a debt restructuring can avoid loss of confidence with the creditors and experience shows that governments are able to borrow soon after default when they communicate easily and quickly with the creditors. Indeed, it is reasonable to predict that the interest rate level on the public debt should rise to include an increasing risk difficult to evaluate.

The redenomination risk does not only concern public debt, but private debt as well. It is to be remembered that companies are debtors on the foreign financial markets to a similar level as public investors. However, it is really difficult to evaluate this risk because the companies hold foreign assets at the same time and to appreciate if the debt losses would be balanced by the asset benefits for the outgoing countries companies.

4. *The recession and inflation risk*

Another redenomination problem is the risk of a higher inflation in the outgoing country due to a rise in the import prices and the effect of rounding-up. As we know, the devaluation effect is during a period of time (estimated around six months) negative because import prices increase immediately and creates an offer shock by increasing raw materials prices for firms and foreign goods for citizens. The devaluation benefits coming from lower export prices are not immediate because not perceived by foreign customers before at least six months. Thus, the outgoing countries with a devaluated currency after redenomination will suffer from high inflation. This rising inflation and the debt burden increase could lead to an economic recession.

When European countries redenominated to euro, specifically Italy and France, they considered that it created a high inflation in their countries in the early 2000s. This phenomenon was supposed to occur when merchants round the prices up to be more convenient. A solution to avoid this risk would be to introduce the new currency at parity with the former, which is obviously impossible when there are different members previously having different values for their national currencies.

5. *The disruption risk*

Finally, introducing new notes and coins as the new currency is launched can be problematic because printing them takes time. A likely temporary lack of coins and notes does constitute a difficulty in a country which redenominated its currency, although electronic transactions are now very developed. In Europe for example, according to ECB (European Central Bank), cash accounts for 5% of total turnover in 2018, but 87% of purchases under 20 euros are paid by cash, and European people still pay 79% of their purchases in physical stores by cash. Nonetheless, during a certain period of time, the former currency would be still in circulation and people might be reluctant to spend it if the new currency is depreciated against the former one. This situation can create disruption and slowdown the economic activity.

Consider also that the redenomination risk rises when it is mixed with a political risk if a party, for instance the Five Star Movement in Italy or the Front National in France, has the potential to win an election and decides to leave the eurozone and redenominate its currency. The political uncertainty strengthens the redenomination risk and makes it worse.

<u>B) The measure of redenomination risks</u>

To estimate redenomination risk, economists use a financial derivative or contract whereby a buyer of corporate or sovereign debt in the form of bonds attempts to eliminate possible loss arising from default by the issuer of the bonds. This is achieved by the issuer of the bonds insuring the buyer's potential losses as part of the agreement. In fact, an investor offsets his credit risk with that of another investor. Most CDS require a premium payment to maintain the contract. This premium is similar to an insurance policy.

The study of Robert De Santis measures the redenomination risk in the eurozone until 2017. The intra-zone redenomination risk is defined as "a joint risk of the probability of a sovereign credit event and the depreciation of the new legal currency". He focuses on Italy, Spain and France, using Germany as a benchmark country. The measure of the redenomination risk is the 10-year sovereign spread between credit-default swaps (CDS) premia in dollar and euro, as it reflects the financial market perception of redenomination risk. This indicator allows to estimate redenomination risk, because the holders of the government bonds are sure to receive a full payment in the event of a financial crisis or major credit event. When the spread is increasing between CDS in dollar and CDS in euro for each country, the perceived risk on the European countries increases.

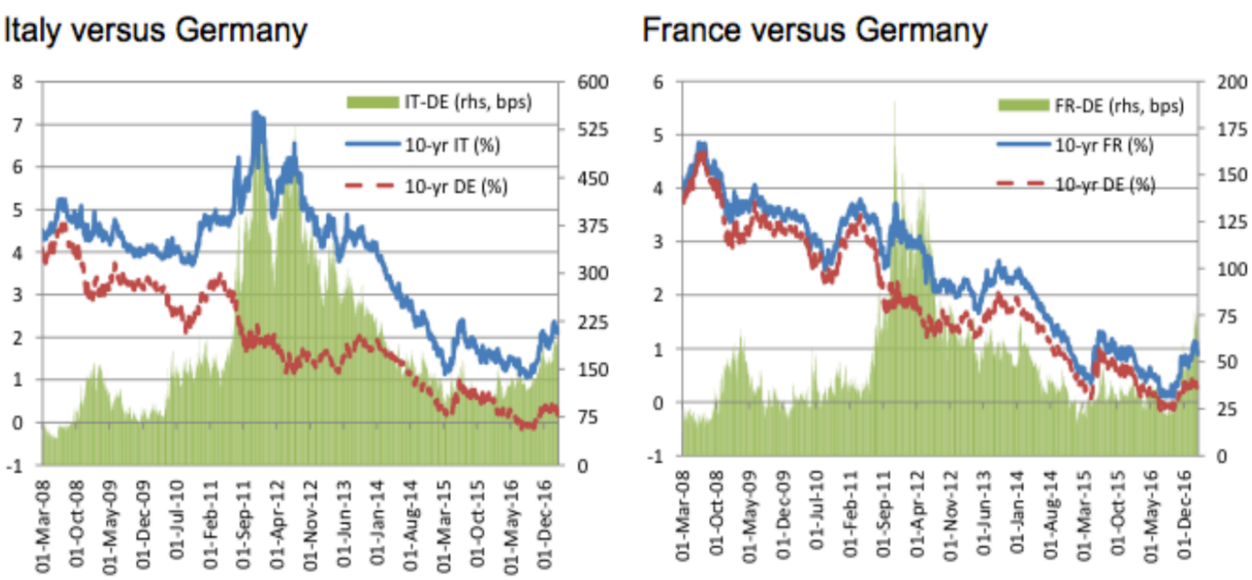


Figure 2: Sovereign yields: 10-year Italian, French and German Benchmark (%, basis points)

Source: Thomson Reuters and own calculations.

This figure shows the 10-year Italian, French and German benchmark sovereign yields in percent and to the left scale. The sovereign spreads vis-à-vis the German Bund are reported on the right-hand scale and in basis points (bps). The results highlight that Italy was the most affected by this risk, knowing that it is followed by Spain and France in third position.

Furthermore, from 2018, the Italian interest rates have strongly increased due to a risk of Italy exit from the eurozone. The risk that the Italian budgetary deficit would be over 3% of the GDP makes the financial markets and creditors worried and they want a higher risk premium to lend to Italy. According to Daniel Gros, director of the Center for European Policy Studies who has compared the five years spread on Italian debt in euro to the Italian debt in dollar, the spread on euro debt has grown by 280 basis points in may 2018, against 100 for the spread on debt in dollar.

The redenomination risk is clearly substantial for the investors who definitely pay attention to it and prefer to lend in dollar to Italy. In 2018, the redenomination risk due to the Italy exit from the eurozone risk involved an important increase in the Italian interest rates on government bonds. The chosen indicator, CDS contracts based on International Swaps and Derivatives Association 2014 seems to be a much better indicator than the former one, because it is including an explicit reference to the redenomination risk of the currency within the eurozone. By the time the euro was introduced, the redenomination risk has not been taken into consideration, and this fact clearly underlines that the risk perception had of course been largely influenced by the euro crisis.

Indeed, the study of Christian Bayer, Chi Hyun Kim and Alexander Kriwoluzky is looking forward to evaluating the term structure of redenomination risk in the euro area using daily default-risk-free yield curve for Italian, French and German bonds over the period comparing bonds that can be redenominated (bonds issued under domestic jurisdiction) and bonds that cannot be redenominated (under foreign jurisdiction), between 2010 and 2014.

This study establishes firstly that Italy is more impacted by redenomination risk than France or Germany with substantially higher yields for default-risk-free Italian sovereign bonds compared to safe international euro bonds; and secondly that redenomination risk influences the short end of the yield curve rather than the long end. More precisely the yield spread for Italy is significant for the one-year yield and disappears for the two-years yield.

Even if the redenomination risk measures tend to provide the same results in the different studies, it is clear that these figures should be considered cautiously. Thus, it is an estimation of the redenomination risk, but we cannot know for sure what are the causes for this spread between pure risk of default and redenomination risk.

Daniel Gros suggests comparing the International Swaps and Derivatives Association of 2014 and 2003 (that does not include the redenomination risk) in 2018, in order to recognize the only redenomination risk. The results show that “the two risks have contributed to a similar degree to the overall increase in Italian risk spreads”.

C) Redenomination in the facts and its results

From World War II to our days, around 69 different countries have left a monetary union, whereas 60 also remained continuously within the unions they belonged to. Some authors, like Rose in his book "Checking Out: Exit from Currency Unions", claim that the countries which have decided to leave a monetary union became bigger, richer and more democratic, but they on the contrary also had to face higher levels of inflation.

For instance, the currency exit of Bangladesh from Pakistan is a clear example of a successful currency exit, even if the trigger was a very serious civil war. In 1971, Bangladesh declared independence from Pakistan, but the government-in-exile could return to the country and start functioning only nine months later. During the war of independence, Bangladesh went on using the Pakistani currency as usual. In 1971, Pakistani notes were simply overstamped with the word "Bangladesh" to be used in Bangladesh during the transition process. Then, while Bangladesh began printing new taka notes to replace the Pakistani rupee, Pakistan central bank declared that all overstamped notes would not be legal tender in Pakistan and demonetized them by issuing new currency notes in different colors and withdrew the old notes from circulation. Even after the war of independence, Bangladesh retained the old currency for several months before demonetizing old notes. In 1972 Bangladesh printed new currency and exchanged the old notes: the taka became Bangladesh's currency in 1972, replacing the Pakistani rupee.

It appears that it is difficult to obtain a good appreciation of the consequences of a redenomination process. This result depends on the specific context of each monetary union and of each country. Therefore, we will discuss the three main issues brought by a redenomination, which concern political, macroeconomic management and financial issues. There are also obviously the psychological effects from the population faced during an exit from a monetary union which are central and determining in the future conditions of the recovery, but they are quite unpredictable and therefore not easy to take into account during the process of redenomination.

1. *The political question*

The first central question is a political one. If numerous countries decide for political reasons to leave the monetary union, the result will strongly change depending on what these reasons are. In general, it is due to the constraint over the national economy control imposed by the monetary union. In 1991, the eastern Europe countries truly benefited from the redenomination of their currency into national currency with the end of the ruble zone, necessary to obtain higher democratic freedom, to initiate, to innovate and to incite foreign firms to invest inside the country.

Debates currently grow in the European Union where some economists (as the Nobel price American winner Joseph Stiglitz) support a redenomination because of the excess value of the euro currency, mainly caused by the overweight of the deutschmark within it, considering the relative competitivity with Germany. Countries like Italy or France should benefit from a depreciation of their currency in case of an eurozone exit.

Yet, everyone knows that an exit from a large country of the European Union would have major consequences upon the zone itself which would probably disappear. Recent studies highlight the fact that the other countries would then confront a deterioration of their competitivity, losses on their foreign assets (very negative impact on wealth) and also a large increase of the interest rates for weak-economies countries because the financial markets would then anticipate the exit of other countries.

Consequently, the other countries would actually leave the eurozone to restore their competitivity and to stimulate their economies as the euro could not give them low interest rates anymore, leading to the dismantling of the European monetary union. It is of course not the same issue for the eurozone survival if the outgoing country is Greece or Germany.

2. *The macroeconomic management question*

The second question concerns the macroeconomic management following the exit. The exiters have common investment shares and budget imbalances, but their trade imbalances are smaller than those of stayers. By the time of the currency union dissolution, inflation is justifiably instable, but the difference is not significant for stayers and for exiters; the same applies to the money growth. In general, there are remarkably few signs of dramatic macroeconomic events either preceding or following currency union dissolutions. Looking at the countries which successfully left one in the past, we see that the leavers generally had small administrations and low developed foreign sectors compared to the large countries which remained within the union.

As indicated within the study of Andrew Rose, these smaller countries have less fiscal capacity to face *asymmetric shocks*[5], and they also benefit much less from the international trade. For them, it is important to use the exchange rate tool, so that they can better face and cope with these shocks. The curbing of these shocks is particularly important in the case of a monetary zone where the budgetary policies are decentralized at the national level.

For larger countries, this is nowadays a more complex situation, as seen with the current debates in Italy, because the main reasons leading to the redenomination are linked with the discipline required within the monetary union, especially when it is dominated by powerful and competitive countries that previously had a strong currency.

Concerning the policies aiming at developing public policies (jobs, health, regional development, infrastructures), there is a risk of budgetary deficit widening, significant currency devaluation and impacts over the inflation and foreign trade subject to some factors among which the effectiveness of money issuing and competitivity. The macroeconomic balance would become hard to maintain without a strong price elasticity of foreign demand for national products and a productive system able to substitute partly the national production with imports (whose cost will increase by the level of devaluation).

[5] *An assymetric shock corresponds to a sudden and large modification of the demand or offer level, affecting a country belonging to the zone without harming the others.*

3. *The financial question*

The third and last sensitive issue in case of a redenomination is the financial one. This is about assessing the balance sheet of the exit from the monetary union, for instance the European monetary union. A way to understand the problem is to study the consequences of such an exit on the balance sheets of economical actors, meaning their assets and liabilities.

As discussed by Cédric Durand and Sébastien Villemot in an article published in the French observatory of economic conditions web site in 2017, it is extremely important to study and evaluate these balance sheets, because they could affect the financial relations, the investment and the trade, and they could have unexpected redistributive effects. Moreover, if not adequately managed, they could even disturb the productive sphere.

CONCLUSION

As a conclusion, this thesis aimed to understand the process of redenomination, its risks and how to measure them in the context of monetary unions.

The first chapter developed the concept of monetary unions. To understand what is a monetary union, we firstly studied the Mundell optimum currency area theory to explain what a "perfect" monetary union would be, secondly the goals of monetary unions, the challenges to face when founding one, and finally the reasons why countries would wish to form, join or leave a monetary union. It seemed important to look at their origins by examining the first examples of what could be associated to a monetary union dating back to the Antiquity; then the XIXth century major monetary unions being the German Union, the Latin monetary union, the Scandinavian monetary union and the Austro-Hungarian monetary union. This analysis pointed out their good points and their mistakes to understand what led to their end and concluded that World War I was the event to which none of them survived, and that the core mistakes of these monetary unions concerned the way they were handled, including the blackmails and conflicts within them. Using these studies, we compared them to the contemporary monetary unions to see what lessons had been extracted during their foundations, and what has improved or not. The conclusion is that modern monetary unions, like the European monetary union, the dollar zone and the franc zone being the best examples, managed to extract some of the major lessons they had to extract from the past monetary unions, mostly about the institutions to create, the selection for member countries, and the fact that they need to serve the Union's interest first. However, there are still big improvements to make in order to become closer to the Mundell's optimum currency area. Indeed, the distribution of power amongst the monetary unions is not completely balanced, allowing more to the large and wealthy countries and less to the others.

In the second chapter, the concept of currency redenomination process within these monetary unions is discussed, by explaining its functioning depending on different concepts, among which we also have included the non-monetary unions case for further explanations. In the end, it appears that the process of redenomination, even if it occurred several times in history, is the subject of many recent studies since the euro crisis occurred. The success of a currency redenomination depends on the reasons why it has originally been decided, for a large part. In a period of high inflation or hyperinflation, a redenomination could be necessary to allow governments to take appropriate measures to struggle against it. After a country fragmentation, redenomination seems to be a rather good solution for promoting economic independence, and this process was for instance successfully achieved in the case of Yugoslavia or the Union of Soviet Socialist Republics outbreaks. Besides, an exit from the eurozone has become a real option nowadays, as political parties in Italy or France defend the idea of leaving the euro area and coming back to their national currencies. They argue that outgoing countries of a monetary union with redenomination take advantage of this exit by exporting more, managing their public deficit as they want and use the monetary policy as a tool to deal with the economic situation. They want to rely on their currency sovereignty, and not to be driven by the most powerful countries inside of it.

The third and last chapter deeply examined the redenomination risk and how to measure it, ending by establishing the balance sheets of the redenomination in the facts and its results. The redenomination of a currency appears complex and risky especially when it is following an exit from a monetary union. The currency redenomination can lead to many risks as it is a multi-faceted risk, the most important one being the collapse of the financial system of the member and as a consequence an increase in fragility of the monetary union financial system as a whole. Mario Draghi, former President of the ECB said in July 2012, when speculation of a break-up of the euro was so strong that the ECB was ready to do "whatever it takes" to prevent this. Therefore, national and foreign investors have specifically included this new risk in their European investment strategy as we could see.

The debate concerning the advantages and the negative consequences of a currency redenomination due to an exit of a monetary union is not coming to an end at all. The supporters of an exit from the eurozone are numerous in the South European countries and France. Italy is even suspected of secretly preparing its exit when Italian parliament voted in favor of a motion in May 2019, authorizing a new currency issue called "mini-BOT" for Buono Ordinario del Tesoro, that is to say short term Italian treasury bills of low unit amount. This parallel currency would be a state debt recognition to help pay suppliers and creditors when needed. Rating agencies like Moody's and many observers point out that this currency is going to rival the euro and wonder if Italy is ready to leave the eurozone because Mario Draghi has warned: " the creation of a parallel currency would be illegal under EU treaties and would push Italy out of the eurozone".

REFERENCES

1) Bae, Kee-Hong and Warren Bailey. 2011.
The Latin monetary union: Some evidence on Europe's failed common currency.
Review of Development Finance, Vol. 1, Issue 2: pp. 131-149.
Publisher: Elsevier.
Available at: https://www.sciencedirect.com/science/article/pii/S1879933711000029

2) Baerten, Jean and Véronique Van Driessche-Godfrind. 2002.
Unions et unifications monétaires en Europe depuis la Grèce antique jusqu'à l'Euro.
Revue belge de philologie et d'histoire, Vol. 80, N. 2: pp. 289-290.
Publisher: Société pour le Progrès des Études Philologiques et Historiques.
Available at: https://www.persee.fr/doc/rbph_0035-0818_2002_num_80_1_6082_t1_0289_0000_3

3) Bagnai, Alberto. 2017.
Back to the future: the macroeconomic consequences of readopting a national currency in Italy.
Powerpoint: *"Beyond the EU".*
Publisher: Università G. d'Annunzio.
Available at: http://www.asimmetrie.org/wp-content/uploads/2017/06/2017_06_28_EP.pdf

4) Banque de France. 2002 updated in 2010.
The franc zone.
The Fact Sheet N. 127.
Publisher: Banque de France.
Available at: https://www.banque-france.fr/sites/default/files/media/2016/11/02/the_fact_sheet_n_127_july-2010.pdf

5) Bayer, Christian and Chi Hyun Kim and Alexander Kriwoluzky. 2018.
Measuring the risk of a euro area breakup.
Publisher: VoxEU.
Available at: https://voxeu.org/article/measuring-risk-euro-area-breakup

6) Bayer, C. and C.H. Kim and A. Kriwoluzky. 2018.
The Term Structure of Redenomination Risk.
Discussion Papers.
Publisher: DIW Berlin.
Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3194420

7) BBC News. March 2, 2012.
A Point of View: Making friends the shared currency way.
Publisher: BBC.
Available at: https://www.bbc.com/news/magazine-17140379

8) Bergin, Paul.
Monetary union.
Publisher: The Library of Economics and Liberty.
Available at: https://www.econlib.org/library/Enc/MonetaryUnion.html

9) Cimenti, Carolina. February 10, 2010.
"No Bailout" Clause ? The EU's Greek Rescue Problems.
Publisher: CNBC.
Available at: https://www.cnbc.com/id/35327584

10) De Foville, Alfred. 1901.
A History of the Latin Union.
Journal of Political Economy, Vol. 10, N. 1: pp. 113-119.
Publisher: The University of Chicago Press.
Available at: https://www.journals.uchicago.edu/doi/pdfplus/10.1086/250808

11) De Oliviera, Matthieu and Jean-Marie Thiveaud. 1992.
Les unions monétaires en Europe au XIXe siècle.
Revue d'Économie Financière, Hors-Série: pp. 161-176.
Publisher: Le Monde.
Available at: https://www.persee.fr/doc/ecofi_0987-3368_1992_hos_2_1_4615

12) De Santis, Roberto A. 2015.
A Measure of Redenomination Risk. - *ECB Working Paper N. 1785*.
Publisher: European Central Bank.
Available at: https://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp1785.en.pdf

13) De Santis, Roberto. 2017.
Sovereign spreads in the eurozone on the rise: Redenomination risk versus political risk.
Publisher: VoxEU.
Available at: https://voxeu.org/article/sovereign-spreads-eurozone-redenomination-versus-political-risk

14) Delatte, Anne-Laure. June 11, 2012.
What risks face the Greeks if they return to the drachma?
Publisher: Observatoire Français des Conjonctures Économiques (OFCE).
Available at: https://www.ofce.sciences-po.fr/blog/what-risks-face-the-greeks-if-they-return-to-the-drachma/

15) Durant, Cédric and Sébastien Villemot. 2016.
Balance sheets after the EMU: an assessment of the redenomination risk.
OFCE Working Paper. Publisher: Observatoire Français des Conjonctures Économiques (OFCE).
Available at: https://www.ofce.sciences-po.fr/pdf/dtravail/WP2016-31.pdf

16) European Commission. 1992 Treaty of Maastricht.
Convergence criteria for joining.
Publisher: European Commission.
Available at: ec.europa.eu/info/business-economy-euro/euro-area/enlargement-euro-area/convergence-criteria-joining_en

17) European Council. 1992 Treaty of Maastricht.
Conditions for joining the euro area: convergence criteria.
Publisher: European Council - Council of the European Union.
Available at: https://www.consilium.europa.eu/en/policies/joining-the-euro-area/convergence-criteria/

18) Gilchrist, Simon, and Raphael Schoenle and Jae Sim and Egon Zakrajsek. 2015.
Financial Heterogeneity and Monetary Union.
Publisher: European Central Bank.
Available at:
www.ecb.europa.eu/pub/conferences/shared/pdf/20151119_debt_overhang/20151119-Zakrajsek-Financial_heterogeneity_and_monetary_union.pdf

19) Goldberg, Linda S., and Barry W. Ickes and Randi Ryterman. 1994.
Departures from the Ruble Zone: The Implications of Adopting Independent Currencies.
The World Economy, Vol. 17, Issue 3: pp. 293-322.
Publisher: Wiley.
Available at: https://www.newyorkfed.org/medialibrary/media/research/economists/goldberg/lsgrublezone.pdf

20) Gros, Daniel. May 30, 2018.
Who lost Italy?
Publisher: Centre for European Policy Studies.
Available at: https://www.ceps.eu/ceps-publications/who-lost-italy/

21) International Democracy Watch.
Central African Economic and Monetary Community.
Publisher: International Democracy Watch.
Available at: http://www.internationaldemocracywatch.org/index.php/central-african-economic-and-monetary-community

22) Klose, Jens. 2019.
Measuring redenomination risks in the Euro area - New evidence from survey data.
Publisher: MAGKS.
Available at: https://www.uni-marburg.de/fb02/makro/forschung/magkspapers/paper_2019/03-2019_klose.pdf

23) Klose, Jens and Benjamin Weigert. 2013.
Sovereign yield spreads during the Euro-crisis: fundamental factors vs redenomination risk.
Publisher: Leibniz Information Centre for Economics.
Available at: https://www.econstor.eu/bitstream/10419/92397/1/77809121X.pdf

24) Krugman, Paul. November 30, 2014.
Being Bad Europeans.
Publisher: The New York Times.
Available at: https://www.nytimes.com/2014/12/01/opinion/paul-krugman-being-bad-europeans.html

25) Levenko, Natalia and Karsten Staehr.
To Be or Not to Be in the Ruble Zone: Lessons from the Baltic States.
Publisher: Leibniz Information Centre for Economics.
Available at: https://www.econstor.eu/bitstream/10419/166668/1/cesifo-forum-v17-y2016-i4-p34-42.pdf

26) Lönnberg, Åke. 2013.
New Money.
Finance and Development, Vol. 50, N. 4: pp. 38-41.
Publisher: International Monetary Fund.
Available at: https://www.imf.org/external/pubs/ft/fandd/2013/12/pdf/lonnberg.pdf

27) Mosley, Layna. Paper presented at the 2005 Annual Meetings of the APSA.
Dropping zeros, gaining credibility? Currency redenomination in developing nations.
Available at: https://pdfs.semanticscholar.org/5f30/6970339bfe7bb0bf61ccf87318d3bfe0d8a7.pdf

28) Mundell, Robert A. 1961.
A Theory of Optimum Currency Area.
The American Economic Review, Vol. 51: pp. 657-665.
Publisher: American Economic Association.
Available at: www.experimentalforschung.econ.uni-muenchen.de/studium/veranstaltungsarchiv/sq2/mundell_aer1961.pdf

29) Puetter, Uwe. 2007.
Monetary union.
Publisher: Encyclopædia Britannica; originally published in "Encyclopedia of Governance".
Available at: https://www.britannica.com/topic/monetary-union

30) Redish, Angela. 2001.
Bimetallism.
Publisher: Economic History Encyclopedia.
Available at: http://eh.net/encyclopedia/bimetallism/

31) Renaud, Ninon. February 26, 2019.
Euro: les gagnants et les perdants de la monnaie unique.
Publisher: Les Échos.
Available at: https://www.lesechos.fr/monde/europe/dans-la-zone-euro-labsence-de-reformes-coute-cher-994217

32) Rice, Thomas. 2014.
Moral Hazard.
Encyclopedia of Health Economics: pp. 334-340.
Publisher: Elsevier.
Available at: https://www.sciencedirect.com/topics/social-sciences/moral-hazard

33) Ryan, John and John Loughlin. 2018.
Lessons from historical monetary unions – is the European monetary union making the same mistakes?
International Economics and Economic Policy, Vol.15, Issue 4: pp. 709-725.
Publisher: Springer Berlin Heidelberg.
Available at: https://link.springer.com/article/10.1007/s10368-018-0416-8

34) Simpson, Brian P. 2014.
Government Interference, Fiat money, and Fractional-Reserve Banking.
Money, Banking, and the Business Cycle, Vol. 2: pp. 113-150.
Publisher: Palgrave Macmillan, New York.
Available at: https://link.springer.com/chapter/10.1057/9781137336569_5

35) Soviet Union. 1970-1979. ***Currency Zones.***
The Great Soviet Encyclopedia, 3rd Edition.
Available at: https://encyclopedia2.thefreedictionary.com/Currency+Zones