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Keywords: Currency Board, Pragmatic, copper coins, small change

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MONETARY REFORM IN TIMES OF CHARLES II (1679-1686): ASPECTS CONCERNING THE ISSUED DISPOSITIONS

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⁺ This paper has been presented at the Economic Thought and Political Philosophy Seminar, Laureano Figuerola, of Rey Juan Carlos University in Madrid. The author wants to thank the comments received in this seminar.

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1. Introduction

The monetary reform performed during the reign of Charles II responds to the imperious need of definitely placing end to the monetary chaos produced as a result of the monetary alterations practiced throughout the XVII century in Castile.

In this essay I chronologically examine the legislation that the reform constituted, I thereby analyze the principal aspects of each of the regulations as well as the immediate effects of the issued laws with regards to the monetary system that motivated the need for new dispositions that were to guarantee the definite stabilization of the monetary system. In effect, I want to study the monetary reform by means of the issued legislation and to understand the reason of the emission of each of the regulations. Therefore the essay does not refer exclusively to the content of such regulations but rather makes reference to the real reach of each measure with regards to the monetary panorama, which justifies the emission of the six dispositions constituting the reform.

We will begin the analysis one year before the coming into effect of the first Pragmatic, concretely in 1679, date in which a special Currency Board was summoned with the end of analyzing the monetary issue. The study of the conclusions of such Board will help us understand the direction followed by the monetary policy which is brought about in the laws issued between 1680 and 1686.

2. Currency Board of 1679

The government of Charles II, directed then by don Juan Jose of Austria, mainly concerned with the complex issue of the circulating numerary, decided to study the problem thoroughly. For this he summoned in March of 1679 a special Board on currency with the purpose of analyzing the issue; the Board was formed by the Government of the Treasury Council, the Duke of Medinacelli, President of the Council of the Indies; don Antonio of Monsalve, President of the Council of Castile; fray Francisco of Reluz, confessor of Charles II and don Andrés of Villarán, President of the Treasury Council. Also, the Board requested the view of different ministers and business men to whom it required to deliver reports about the matter¹;

In the summer of that same year, concretely on August 13th, once the opinions were received and those of its members analyzed, the special currency Board was in disposition of issuing the pertinent consultation, directed to the King, in which they exposed their conclusions and proposals so that his Majesty were to adopt the solution that he considered appropriate². The written consultation reflects how all the members

¹B.N.M. Mss. 18720, exp. 23. Consultation of the Currency Board. August 13th of 1679.

²B.N.M. Mss. 18720, exp. 23. Consultation of the Currency Board. August 13th of 1679.

of the Board were in agreement on the remedy but not in the manner of implementing it. Three different opinions existed.

The first consisted in the defence of the idea that the total extinction and prohibition of the mill coin had to be executed. The members of the Board estimated that if this extinction was not carried out, in any condition in which that coin remained, across time it would generate the same problems that it had now. Those who defended this position considered that for the time being it was not possible to carry out this extinction, as the Kingdom would not be capable of withstanding the loss of seven millions of ducats, estimated amount that circulated of these pieces.

Others considered that given that actually it was not possible to carry out the total extinction of this coin, what was recommended was to carry out a devaluation of the coin differentiating it among the circulating pieces. The devaluation would only have to affect the false coin introduced in the Kingdom while the legitimate one of legal tender, would not have to be affected. Nonetheless the Board considered that this remedy would bring forth innumerable difficulties given that at that time there were across the kingdom four different kinds of mill coins:

- a) The primitive: which had 20 grains of silver and seven ounces and sixteen grains of copper in each mark.
- b) The one which immediately begun to be falsified inside the kingdom consisting solely of copper without any mixture of silver.
- c) The one which afterwards was also introduced from outside solely of copper but lighter and thereby of less value.
- d) The one which lately had been introduced, so light that it did not correspond to a maravedi of copper.

The Board considered impracticable to perform this separation as the primitive and the one which was falsified, solely of copper but with equal weight, became so difficult to distinguish that to separate them would bring forth an enormous confusion to commerce.

Lastly the third opinion considered that, given the impossibility of performing the definite consumption of the old copper coin, due to the lack of necessary metal with which to produce the new numerary, and given the great difficulty that it would mean to separate the legal coin from the false one in the common of commerce, one had to apply indistinctively to all the pieces the remedy of the removal, whether they be false or legitimate.

It was this third remedy with which the members of the Board finally agreed on: they estimated that the most convenient approach would be to decree a transitory removal of the whole of the circulating mill numerary with the idea of decreeing its definite consumption when the situation was favourable for it. The consultation depicts it in the following terms:

El ejecutarse desde luego la extincion y consumo dela moneda hara lo mejor y no es menester fundarle pues nadie duda que si al cuerpo umano que padece una enfermedad mortal sele puede curar de una vez, no a de contentarse el medico con mejorarle, pero quando para sacar de este cuerpo la raiz de la dolencia es preciso extinguir toda la sangre, consiguientemente le precisa a perder la vida y en este casso obliga la prudencia a que se contente con apartarle del sumo peligro aplicando remedios proporcionados al estado y disposicion del sujeto y tomar tiempo para la perfecta curacion.³

It is necessary to emphasize how the Duke of Medinaceli performed a particular vote and expressed himself totally against the removal for considering that this one would not constitute a good remedy to end the entry of foreign coins neither would it reduce the price of silver and of the other goods. He defended the total extinction of the old copper coin. Despite this he expressed that in the off chance that the removal were to take place, it would be more convenient to perform it further down the road when the fleet of the Indies had arrived and the silver had been distributed:

Que por medio de la baja no se consigue el fin de excusar la introduzion de esta moneda pues siempre le queda ganancia al que falsifica que no quedando en su valor intrinseco no saldra la Calderilla ni el vellon grueso, no se moderara la reducion de la plata, ni el precio de las cosas i que oy es mala coyuntura de qualquier novedad que la ocasion del feliz casamiento de V. M. Que quando la vaja hubiese de ejecutarse (no pasandose a la total extincion que es a la que se ynclina) havia de ser a 3 ó 4 meses despues del arribo de flota y galeones y que se aya difundido la plata que viniere.

Nonetheless, it is also necessary to express how everyone who proposed the removal considered that this was not the end. It was simply a means for, throughout time, achieve the total extinction of the mill coin that all considered necessary but impossible to carry out in the meantime. Therefore the removal was conceived as a provisional and transitory measure until the definite consumption of the old copper coin was achieved.

Todos los que proponen la vaja no la miran como fin sino como medio para conseguir la total extincion pues esta la consideran por inescusale, pero por imposible y echa la vaja mas facil y de menores inconvenientes.⁴

In the consultation it was expressly mentioned that this solution had to be in effect exclusively around six to eight months, after which the total consumption of such coin had to take place.

Once the solution for the indistinct removal of all the pieces was approved, it remained to be decided the amount of the devaluation. The Board considered that a reduction of the fourth part of its value had to take place, in such a way that the pieces of eight maravedis were to be reduced to two maravedis. And those of four to one. With this removal, the Board was conscious that the nominal value of the legitimate pieces remained below their intrinsic value, but if it did establish another value it would be the false pieces the ones that would remain with a nominal value superior to the intrinsic one. Overvaluing the false pieces would cause serious losses to the Royal Treasury that would have to pay for them more than their value. To avoid this expense it opted to affront the legitimate pieces and, thereby, that the individuals were to carry the loss. To compensate for the losses that the owners of the legitimate coin would suffer, the Board considered that these losses could be settled when the definite extinction took place, moment in which the Royal Treasury would pay to the owners of such pieces all their value.

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³B.N.M. Mss. 18720, exp. 23.

⁴B.N.M. Mss. 18720, exp. 23.

It was considered that the month of October would be a good moment to carry out the devaluation. At that moment, the Kingdom, after the arrival of the fleets and galleons from the Indies, would find itself more relieved with the American silver already molten, the harvests collected and the Queen in Spain⁵.

Anticipating the complaints that could arise from the fact that the value of the false pieces and the legal ones were to be matched, when all in all they had different values, it was argued that this was not a new case in the law. Examples were quoted like that of the disposition adopted in 1628 in which it was ordered to implement a 50% devaluation of all the old copper coin.

3. Pragmatic of February 10th, 16806

The political instability that caused the sudden death of don Juan Jose, occurred in September of 1679, somewhat delayed the beginning of the reform. Finally the removal of the old copper coin proposed by the Board was set on the 10th of February of 1680. An extended Pragmatic was enacted accompanied with an Instruction, in which a drastic reduction to the fourth part of the value of all of the circulating old copper coin was ordered. The principal points of this regulation were three:

- 1. That the mill coins linked with silver, carved in the Mint Houses of these Kingdoms, was to be reduced to the fourth part, in such a way that the pieces of eight maravedis were to be valued at two pieces, those of four at one and the rest in the same proportion.
- 2. That all of the mill coin of pure copper that had been produced in these kingdoms in imitation to the legitimate one was also to be reduced to the fourth part of the value with which it then circulated.
- 3. That the rest of the mill coins produced outside of these kingdoms and introduced by foreigners, was to be reduced to the eight fraction of the value with which it circulated at that moment.

As a complement of these dispositions there were two other sections in which they were specified the concrete measures to mitigate, in a certain manner, the losses that, both the owners of the coins and those who had debts incurred beforehand with the Royal Treasury, were to suffer. From 1652 it was common that the removal Pragmatics included dispositions in this sense.

The first of these palliative dispositions made reference to the mill coin linked to silver produced legitimately:

Y atendiendo a evitar cuanto sea possible el perjuicio de mis vassallos, i que, los que se hallaren con la moneda de molino de la primera fabrica, y ligada de plata, no experimenten con la baja la perdida, ni la dificultad de valerse de este caudal; por aliviarles la descomodidad, i el daño, mando que todas las cantidades, que pusieren en las Casas de Moneda de estos Reinos, ó entregaren en mis Arcas, i

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⁵ Doña María Luisa of Orleans y Charles II had married by powers on the 31st of July of 1679 in the chapel of the palace of Fontainebleau. It was expected that by October the queen would already be in Spain, but finally the trip got delayed and the french princess arrived to Spain, from Irun, on November 3rd of that same year of 1679.

⁶ Nueva recopilación, book V, Title XXI, auto XXIX.

bolsas Reales, se les reciban, i paguen por todo el valor, que oi corre en moneda de plata, ú oro con el premio de 50 por 100 al respecto de los 165 mrs. de liga, que tiene cada marco, i se les dé satisfaccion en contado por cuenta de mi Real Hacienda, i por hacerles este beneficio.

The second one referred to the debts that the individuals maintained with the Royal Treasury. With this measure the government tried to avoid that these debts suddenly found themselves multiplied by four. For this reason it was ordered to remit and to write off all the income or service payments delayed until the end of 1673. The Crown would assume this loss, estimated in more than twelve million ducats and it expressed:

i que mis Reinos, i vassallos gocen de esta relevacion, i alivio, i que dichos devitos se testen de mis Libros Reales, i queden libres los Consejos, Ciudades, Villas, i Lugares, Universidades, i particulares, que fueren deudores, sin que por esta razon se les moleste ahora, ni en tiempo alguno con Jueces Executores, Ministros, costas, ni salarios, porque en todo han de quedar absolutamente libres, i relevados de esta obligacion;

The royal amnesty did not extend itself to the rest of the debts generated between 1674 and 1677. For these ones a period of sixty days was established, counted from the publication of the Pragmatic in each place, in which they could be settled with the value that the coin maintained before the removal. After this period the payments would have to take place according to the new value of the pieces.

At the end of the Pragmatic there was an appendix titled *Instruction about the removal of the mill coin*, in which they were clarified different concrete aspects in relation to how the change of the value of the coins should take place. In such Instruction two principal aspects were emphasized⁷:

First, it was ordered to carry out a registry in the houses of administrators and business men of the Kingdom to differentiate and count all the mill coin that was found. One had to separate and note down the amount that was found of coin with link of silver, that of pure copper and the false ones introduced from outside the Kingdom. Once the registry was executed, for which a period of six days was established, all the pertinent reports would be remitted to the Council of Castile and to the Royal Treasury. This registry was aimed to avoid the losses to business men.

The second aspect of the Instruction once again made reference to the period of sixty days in which the payments of outstanding debts that took place with the Royal Treasury could be settled with the value that the coins had before the removal. Here it was specified how the annotations of such payments had to be carried out, in which, to be able to classify them as correct, the coins in which the payments had taken place had to be recorded.

Similarly, at the end of the Instruction it was ordered to report to the Council both the registered amount of old copper coin as the payments that were being settled with the Royal Treasury, allowing the Government to evaluate the repercussion and compliance of the issued law and so that the weaker points could be corrected or amended as soon as possible.

⁷ Nueva recopilación, book V, Title XXI, auto XXIX.

The Pragmatic was published, as the chamber scrivener of the King don Luis Vazquez of Vargas testified in Madrid, the already mentioned 10th of February of 1680 at the door of the Royal Palace. This same scrivener certified, on the publishing date of the regulation, that the value of the Pragmatic had been established in two reals. It could not be sold for any other price nor could it be printed without the license of Miguel Fernandez Noriega, secretary of his Majesty and oldest chamber scrivener⁸.

All in all, this new ordinance, published sixteen years after the last monetary regulation, represented a reduction of the fourth part of the value of the mill coins. The aim of this measure was that of stabilizing the monetary system and to stop the alarming increasing pace undertook by the price of silver: the Government was trying to put an end to the business of the forgers of coin by adapting the nominal value of such coins to their intrinsic value with which the profits obtained when producing false coins would disappear, and the existing monetary disorder would end.

One of the main purposes of the reform was that of achieving the return to circulation of the silver coin, absent from the monetary panorama (this absence is due to the well-known effects of the already mentioned Gresham law, according to which the "bad" coin displaces the "good one" from circulation). A Proceeding published on May 11th of 1680 clearly expressed this fact⁹.

The individuals had opted to store up this coin as it was considered a safe value against the existing instability. The Crown had excluded from its monetary operations the pieces of noble metal, which values has remained immutable from the Pragmatic of Medina del Campo enacted by the Catholic Monarchs in 1497, with the exception of the failed attempt of emission of a new silver coin in 1642. The continuous mutations suffered by the pieces of old copper coin had motivated their massive use as the individuals wanted to get quickly rid of them and store up the silver pieces. The absence of silver from circulation gravely distorted commerce as it made payments difficult. The last purpose of the reform was to achieve the return of silver to circulation. To achieve this it was necessary to end the imbalance of valuation that the old copper pieces suffered. With the adjustment of the pieces, forging would be discouraged and the effects of Gresham's law would end.

The Pragmatic of February of 1680 decreed a removal that diversely affected all the pieces of old copper coin according to their quality. Even though the Currency Board had differentiated four types of coins, in the Pragmatic, only three different types of this species were distinguished: the legitimate one, the solely copper one produced in the interior of the Kingdom, both of which had to be reduced to the fourth part, and the fake one produced outside and introduced by the foreigners, that had to be reduced to the eight part of its value. The Government, when jointly classifying all the fake coins introduced from outside, without distinguishing amongst their weight, tried to avoid the problems that the attempt of distinction of such coins would bring forth.

An aspect of the Pragmatic that can call one's attention is the fact that the value of the legitimate coin and that of the fake one produced inside was matched. In the Board this aspect had already been dealt with and, given the great difficulty that it would convey to

⁸ A.G.S. General Department of Treasury, inventary 14, dossier 1.

⁹ A.G.S. General Department of Treasury, inventary 14, dossier 1.

separate them, it had been recommended that they were to circulate with the same value. It had been considered that any other measure would of have made commerce suffer greatly. A clear and funny fragment of the consultation of the Currency Board, dated in August of 1679, can illustrate us this aspect:

La confussion que causaria en el comercio la separacion, pues el panadero que a de dar su pan al carnicero i los demas que proveen los pueblos de mantenimientos para la vida umana habrian de hacer examen de cada pieza de las que recibieran si era buena o falsa i sobre aceptar o repeler la moneda a que habia de dar sentencia en que vende y aprovarla el que compra no puede llegar el discurso a los daños que precisamente habian de originarse pues este juicio le ha de hacer el rustico el lacayo el oficial el colerico el sedicioso y el que se alla turvado del vino y cada uno con el deseo de engañar al que vende y este de no ser engañado pasando de la disputa a las manos, y a las desdichas que de ello pueden seguirse pues la turvacion de una Republica nunca tuvo principio en los sujetos a la prudencia y siempre la han ocasionado los de pocas obligaciones¹⁰.

Anyway, we have already seen how the Pragmatic did indeed take into account the differences according to the nature of the circulating pieces when establishing the consequences of the removal. It tried to mitigate the harm that the owners of the legitimate coin would suffer when establishing that all the pieces of this type that were to be handed to the Mint House were to be received and reimbursed for all the value that they had before the removal. While the owners of the fake coin would only receive the corresponding value to the delivered metal.

The adopted resolution was a reflection of the opinion of the Board and, therefore, transitory. Despite that in the Pragmatic, to avoid that the people considering it transitory would not obey, nothing was said of the last purpose of the Crown.

The apparition of this regulation caused many reactions amongst the individuals and the Institutions. Similarly it gave place to the publication of new memorials in which some effects of this regulation were analysed, as for example the shortage of fractionary coin reflected in some documents written in 1681.

After the publication of this regulation, two are the aspects that needed to be complemented with new government dispositions: the manner in which the registry of the coins had to be carried out and the periods that had to be followed to receive the income of the Crown without damage to the vassals, also dealt with in the same Instruction. To these matters it was added, after the promulgation of the law of March 14th of the same year, as third main character of the complementary legislation, the aspect of the sending of the pieces retired from the circulation to the mint houses with the purpose that they be minted again.

The great amount of documentation that about these matters our files keep will allow us to know well enough the situation that the monetary reform generated¹¹.

¹⁰ B.N.M. Mss. 18720, exp. 23. Consultation of the Currency Board. August 13th of 1679.

Currently the majority of these papers are found in the General Archive of Simancas in the dossiers 1 y 2 of the inventory number 14 of the section of the General Department of Treasury as well as dispersed amongst the different dossiers of the section of the Treasury Council and Boards which group records of these years. Also important papers exist in the section of the General Accounts Department. Ocassionally we have also located relevant documentation of this kind in the section of State of the same file and in the section of Councils of the National Historic Archive. It is also necessary to mention the section of the

4. Royal Warrant of March 14th, 1680

The large devaluation ordered on February 10th greatly limited the amount of circulating fractionary coins; this could in turn cause serious damages both to commerce and to the individuals. With the purpose of remedying this shortage the Government ordained, by virtue of the Royal Warrant of march 14th that all the mill coin, except the legitimate one of mills linked to silver, that was to be collected in the Mint Houses should be carved again in the thick old copper coin of the value, weight and shape that had the one that circulated at that moment with value of two maravedis ¹². That is, a new coin of pure copper minted on the grounds of thirty seven pieces per mark, to which a nominal value of two maravedis was assigned. This measure confirmed the transitory character of the pragmatic of the 10th of February. It happened to be a first step towards the definite withdrawal of the mill coin that would be in turn consumed as it was collected in the Mint Houses. The new coin, minted with the collected metal, would substitute it in circulation.

5. Pragmatic of May 22nd, 1680

The Pragmatic of May 22nd of 1680 constituted another of the fundamental pillars of the monetary reform. The consumption of the mill coin did not take place at the expected rhythm. For this reason, on May 22nd, the Government published a new pragmatic in which the circulation of all the pieces of old copper coin, both the fake ones and the legitimate ones, was prohibited. The purpose being that they be definitely withdrawn from circulation from the moment of the publication of the law, and destituted of all value. Consequently they could not be used from that moment neither in commerce nor in any other transaction:

Mandamos que toda la moneda de vellon de la fabrica de molino que hay en estos Reinos, así la legitima con liga de plata, que se labró en las Casas de Moneda de ellos, como tambien la falsa fabricada de solo cobre dentro de ellos, i la feble, que se ha introducido, é introduce por los Estrangeros, i Naturales, se prohiba el uso de ella, i no corra por moneda de ningun valor desde el dia de la publicacion de esta lei en adelante para siempre, ni se reciba, ni pague, ni corra en el Comercio mayor, ni menor para ningun efecto, paga, quita, ó redencion, ni en ninguna compra, ni venta por mayor, ni por menor.¹³

This Pragmatic, as that of February 10th, was also published in the Villa of Madrid at the entrance of the Royal Palace¹⁴. And its publication was signed by Diego of Ureña Navamuel, the King's chamber secretary, who also certified that the price of such should be fixed in a real and a half, not being one able to sell it at any other price, nor be

General Indifferent of the Indies Archive where we have found some interesting papers for our study dealt with in the Council of Indies.

¹² We have not found a copy of this Royal Warrant that has not also been included in the New Compilation of the Laws, we do know however its existence through the references to it that appear in later documents. In this case we have used a consultation of April 9th of 1680 found in the A.G.S. General Department of Treasury, inventory 14, dossier 1.

¹³ *Nueva recopilación*, book V, título XXI, auto XXX.

¹⁴ A.G.S. General Department of Treasury, inventory 14, dossier 1.

printed without the licence of Miguel Fernandez of Noriega, secretary of his Majesty and oldest Chamber scrivener¹⁵.

As it already did on the 10th of February, the Pragmatic of May 22nd also distinguished the losses that the holders of the legal coin would suffer from those who were in possession of the fake coin. The good pieces could be used by their owners to cover outstanding debts with the Royal Treasury subsequent to the year 1678. In the off chance that one had nothing to pay, such pieces could be melted or sold to foreigners or nationals. The rest of the coins had to be surrendered in the mint houses in a period of ten days. In exchange the owners would receive money in cash for those entries that did not exceed the amount of five hundred reals, Royal vouchers payable in three months for those amounts between five hundred reals and one hundred ducats, or the same vouchers with a maturity date of one year settled every four months for amounts exceeding one hundred ducats.

To avoid suddenly leaving commerce without fine pieces, the Pragmatic stipulated that these ones could be used in the two subsequent days of its publication.

The fourth point of this ordinance again confirmed the superior limit of the official price in fifty percent.

Together with this Pragmatic an extensive Instruction was published by special warrant. Its principal points specified how the bartering of old coins should be carried out trying to avoid frauds being committed in the execution of the law¹⁶. In the Instruction it was expressly manifested how the amounts received in the chests in the ten day period subsequent to the publication of the regulation, would receive, in cash or in vouchers according to the amount retrieved, the equivalent value to the surrendered pieces. After the established ten days, the coin would not be received for all its value but by the corresponding amount in common coin to the weight of copper of the sum surrendered. It was at this moment that the Royal Treasury undertook most of the costs, included those of the factory and labour of the new coins. With this the Crown tried that the vassals would lose the least possible with the exchanges so that, both the new issued pieces and the developed monetary policy were to enjoy full confidence.

The main problem that could appear was that of the shortage of coin, for this the Instruction also contemplated the possibility that in those places with scarce population the banned numerary could circulate not only during the allowed two days but also during the ten days established to carry out the exchange of the coins.

The true purpose of this Pragmatic was explained with great precision in a consultation issued a year later by the Council of State in which it was reflected how the individuals, when noticing the fact that the legitimate pieces had a real value than that assigned in the Pragmatic of the 10th of February, had stored them up so that only the fake pieces remained in circulation. For this reason, foreigners continued introducing forgeries. The objective of the removal had not been accomplished and the Government had no other option that to totally prohibit the circulation of such pieces.

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¹⁵ A.G.S. General Department of Treasury, inventory 14, dossier 1.

¹⁶ Nueva recopilación, book V, title XXI, auto XXXI.

Habiendose experimentado en la baja de 10 de febrero que habiendola reducido a la quarta parte de valor cayendo muchos en la quenta de que le tenia mayor la guardaron quedando solo el uso de la falsa por lo qual y no cessar la introducion extrangera fue precisso passar a la prohibicion de una y otra, la falsa por que lo era y la legitima porque no estava en uso. ¹⁷

With the publication of these two important Pragmatics, completed with the Royal Warrant of March 14th, the intentions of the Crown were clearly stated: to retrieve and consume all mill coin from circulation, and substituting it with new pieces of pure copper, minted in the Mint House of the city of Segovia, with a value of two maravedis each piece on account of seventy four maravedis per mark¹⁸. The new coin of pure copper would eliminate the problems that the linked coins caused.

From here on, the legislative orientation aimed towards trying to collect in the mint houses de maximum possible amount of old coins in order to be able to carry out the production of the new pieces. At this moment fiscal interests were left aside and monetary policy became the primary issue. Two centuries of strong monetary instabilities had to end and in the first semester of 1680 the first steps were taken in this respect. There is no doubt that the Government's bet was very ambitious and the risk of failure high. The costs undertaken by the Royal Treasury were large and the possibility to leave commerce without fractionary coin had also to be taken into account. Another factor that could endanger the success of the reform was the lack of trust on behalf of the citizens that were enduring almost two hundred years of monetary alterations. If this lack of trust motivated the failure to comply to the dictated orders the undertaken reform would tragically fail.

6. Pragmatic of October 9th, 168419

These Pragmatics were not definitive: the retrieval and consumption of the mill pieces did not take place and the new coin could not be produced. The shortage of fine coins that the Kingdom suffered after the regulation of may 1680 forced, four years later, to dictate a new order: on October 9th of 1684 another Pragmatic was published that abolished the prohibition in the regulation of May 22nd of 1680. This new regulation authorized the return to circulation of the legitimate pieces of mill with a nominal value in accordance with their intrinsic value, therefore higher that that arranged by the Pragmatic of February of 1680:

Queremos, i mandamos que (sin embargo de lo dispuesto por la Pragmatica de 10 de Febrero del año de 80, en que se mando que la moneda de molino ligada legitima corriesse a tres reales el marco, i a este respecto la pieza mayor al precio de dos mrv. i la menor a uno; i la de 22 de Mayo del mismo año, en que se prohibio absolutamente el uso de esta moneda) que la dicha moneda de molino legitima ligada de plata, fabricada en las Casas de Moneda de estos Reinos, buelva al uso de moneda, como antes le tenia, quedando reducido su valor a razon de seis reales el marco, i cada pieza mayor, que por la Pragmatica de 14 de Octubre corrio por ocho mrs. i despues por la de 10 de Febrero de 80 se reduxo a dos, corra de aqui adelante

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¹⁷ A.G.S. State, dossier 4130.

¹⁸ A.G.S. General Accounts Department, dossier 821.

¹⁹ Nueva recopilación. Book V, Title XXI, Auto XXXIII.

a quatro mrs. i la menor a dos, quedando en su fuerza, i vigor la prohibicion de la moneda que no fuere legitima, fabricada en las Casas de Moneda de estos Reinos.

The promulgation of this law did not represent a step backwards in the initiated reform, one can consider it as a change of direction, once proved the failure of the first route. The last end of such consisted in providing the Kingdom with a stable and balanced fractionary coin that would allow the return of silver to circulation. The legislation issued up to now had not correctly adjusted the value of the mill numerary, nor had it managed to provide the Kingdom with new healthy fractionary coins, nor even, obviously, achieved the return of silver to circulation, and if this was not enough it had left Castile practically without coins.

One had to try again amending the errors: having seen that the minting of the new pieces did not prosper, it was necessary to allow the use of the old ones that remained stored up by the individuals. But this time the Government did not fail and it only allowed the return of the legitimate pieces produced in the mint houses of the Kingdom. It assigned them a value of six reals per mark, that is to say, the larger pieces would have a value of four maravedis and the small ones of two, as opposed to the two and one maravedis to which they had been reduced by the Pragmatic of February 10th of 1680.

This way it managed to achieve the double objective of providing the Kingdom with small coins, when making return to circulation all the pieces that had been stored up by the individuals, and of adjusting the values of the old copper coins. The prohibition of the fake pieces guaranteed the use of the legitimate ones that, this time, were not affronted.

The Pragmatic also corroborated the established sanctions in previous laws for all those who produced, introduced or used fake coins in these Kingdoms.

7. Pragmatic of October 14th, 1686²⁰

Finally we encounter the last monetary regulation that ends the reform. This new disposition represented the adjustment of silver and gold pieces to the new values of the fine coins, afterwards it became necessary the emission of three brief corrections.

It was this a necessary action that was being demanded time before. Numerous voices had arisen throughout the XVII century in favour of a readjustment of the value of silver, without going into this aspect, we mention the Cardona's disposition in favour of the increase of silver in the beginning of the XVII century, the writings of Antonio Somoza and Quiroga addressed to don Juan José of Austria in the previous moments to the beginning of the reform or a consultation to the Council of State dated in 1681 in which this possibility was also considered. It was now that finally it was put into place. On October 14th of 1686 a Pragmatic was published in which the new values that the silver and gold coins had to have were established. With this law an increase of the value of silver up to a fourth part took place. Previously, of each mark of silver, 67 reals were carved. From this date onwards, they were 84 pieces or reals of silver with a value of 34 maravedis for each one²¹. The silver mark continued having the same law and

²⁰ Nueva recopilación. Book V. Title XXI, Auto XXXIV.

²¹ This rise coincided with the Cardona's proposal. See section 2.6.

weight that was established in Medina del Campo, the only difference would be the number of minted pieces for each mark.

Queremos, i mandamos que el marco de plata de lei de once dineros i quatro granos, que hasta ahora en pasta, o baxilla tenia el valor de 65 reales, i de que se han labrado 67 reales, quedando dos de ellos para el señoreaje, i braceaje en las Casas de Moneda, i 65 para el dueño de la pasta, i materia de que se fabricaba; para en lo de adelante valga en pasta, i baxilla 81 reales i quartillo, que es la quarta parte mas, que se da de crecimiento al valor del marco de plata; i que, labrada en moneda, se estienda, i saquen de el 84 piezas o reales de plata, de valor cada una de un real de plata de 34 mrs, los dos para el señoreaje, i braceaje en la misma conformidad que hasta aquí, i los 82 para el dueño de la labor, dando al marco, de que se han de fabricar las 84 piezas, la misma lei, i peso, que tenia el marco, que conforme a las Leyes de estos mis Reinos se labraba hasta aora. 22

At this moment two types of silver coins began to circulate. They were denominated of old silver and of new silver. Even though the government considered that it could prove convenient to retrieve the old pieces from circulation, it allowed that these ones were to continue circulating to avoid worsening the shortage of circulating coin²³. Equivalence was established between the old coins and the new ones: a silver real of eight would equal ten reals of new silver:

la moneda de plata, que hasta aora se ha labrado con nombre de real de a ocho, i segun el aumento, que se da al marco de plata por esta nueva lei, queda con el valor intrinseco de diez reales de plata, los valga, i corra en estos Reinos con la estimacion de diez reales de plata con el nombre de escudo de plata, i la que hasta aora se ha labrado con el nombre de real de a quatro, valga i corra por cinco reales de plata con nombre de medio escudo i a esta proporcion los de a dos i sencillos.²⁴

It is possible that the Crown would not want the same situation of monetary shortage taking place after the prohibition of circulation of the fine coin in 1680, and despite the confusion that it would bring, it preferred to maintain the two monetary species. The Pragmatic continued in the following terms:

I por que haviendose dado extension a la plata, es justo se de tambien al oro; queremos, i mandamos que el marco de oro se mantenga, i labre con el mismo pero, i lei, que hasta ahora se ha labrado; pero queremos, i mandamos que el escudo de oro, que hasta aora por Pragmatica de estos Reinos tenia de valor quince reales de plata, tenga el valor de diez i nueve i el doblon de a dos escudos, que por la misma Pragmatica tenia el valor de treinta reales de plata, valga treinta i ocho i a este respecto los doblones de a quatro i de a ocho.²

In other words, the value of the gold pieces was also increased in the same proportion as it had been done with those of silver.

In this same Pragmatic the price was maintained with respect to the billon in 50 percent for both gold and silver.

 $^{^{22}\ \}textit{Nueva recopilación}.$ Book V. Title XXI, Auto XXXIV.

²³ Nueva recopilación. Book V. Title XXI, Auto XXXIV. ²⁴ Nueva recopilación. Book V. Title XXI, Auto XXXIV.

²⁵ Nueva recopilación. Book V. Title XXI, Auto XXXIV.

To stimulate the production of the new pieces, those who were to take to mint the silver dishes would be exempt of the payment of the lordship rights. At the same time regulations were established to avoid the lawsuits or discussions that could arise in the compliance of outstanding contracts and obligations to pay in silver, and also in the case of the existence of deposits. It was established that the obligations had to be settled in the same manner in which they produced themselves.

Days later, on October 21st the consultation was published. According to it, the same measures were established for the outstanding debts in gold as those that had been dictated for liabilities in silver²⁶. And a little later, already in the month of November, three small corrective measures were enacted which completed the important pragmatic of October 14th. The first one, a consultation published on November 4th, established a minimum variation, due to the commodity in the exchanges, in the silver coins²⁷. In such a way that it was ordered that the real of eight of old silver, that with the rise was valued in ten of silver and fifteen of billon, that is, equivalent to one hundred and twenty seven quarters and a half, would be valued in one hundred and twenty eight quarters. The Council ordered this, previous consultation with his Majesty, for considering that the half quarter constituted a great embarrassment for the payments and for commerce, and that the difference with the new equivalence was practically null. In similar way it was carried out with the smallest pieces, so that the real of four remained established in sixty four quarters, the one of two in thirty two and the real of silver in sixteen quarters.

The second corrective consultation was published, also in Madrid²⁸, on November 18th. It made reference to new aspects of the deposits and outstanding debts that had already been mentioned in the Pragmatic of October 14th. The consultation itself explained how, despite having been studied in the previous law, there still remained doubts and lawsuits about the issues covered that had forced to insist on it again. The definite order remained stated in the following manner:

Que las letras, que al tiempo de la publicacion de la Pragmatica se havian dado, i estaban aceptadas con obligacion de pagar en plata, ú doblones, ó no estando cumplidas, ó estandolo, i no pagadas, aunque estuviessen empezadas á pagar, se satisfagan enteramente conforme al valor que las monedas de plata, i oro, tenian al tiempo que se dieron;

Finally, on the 26th of that same month, a last consultation was published, in which it was extended to the Castilian²⁹ of gold the increase suffered by the coins of this metal³⁰. Its new value was fixed in twenty eight reals of silver, instead of the twenty four that it had before. In this consultation it was also ordered to assess the value of the gold in paste and in jewels according to these new values.

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²⁶ Nueva recopilación. Book V. Title XXI, Auto XXXV.

²⁷ Nueva recopilación. Book V. Title XXI, Auto XXXVI.

²⁸ Nueva recopilación. Book V. Title XXI, Auto XXXVII.

²⁹ The castilian is a weight measure used for gold and silver, it corresponds to a fiftieth fraction of the mark, that is, 4.60 grams.

³⁰ Nueva recopilación. Book V. Title XXI, Auto XXXVIII

With this measure the hard and costly reform undertaken in 1680 was put to an end. Six long years of changes did the Castilians suffered and had as a result the monetary stability.

We do not find explicitly in any document the proof of the success; however the decreed legislation in monetary matters from that date onwards will give us strong proofs of stability. The future stability of the monetary values silently corroborates the efficacy of the reform carried out under the Government of the last Austria.

As a conclusion we have witnessed a long and hard reform, which, despite the problems and difficulties that it generated in the short term, it was very positive for the Castilian economy. It managed to adjust the monetary values of the different circulating pieces and it maintained the monetary system stable.

SUMMARY CHARTS SHOWING THE EFFECT OF THE **POLICIES APPLIED**

1. TABLE SHOWING COIN EQUIVALENCES BEFORE THE 1680-86 REFORM

METAL	NAME	Nominal weight in grams	Equivalency in maravedis	Other equivalencies	Popular name
	Onza	27,04 gr.	4.080 mrs.	120 reales of silver	
GOLD	Media onza	13,52 gr.	2.040 mrs.	60 reales of silver	Doble doblón
	2 escudos	6,76 gr.	1.020 mrs.	30 reales of silver	Doblón
	Escudo	3,38 gr.	510 mrs.	15 reales of silver	
	Real of 8	27,44 gr.	272 mrs.		Escudo of silver
	Real of 4	13,72 gr.	136 mrs.		1/2 escudo of silver
SILVER	Real of 2	6,86 gr.	68 mrs.		
	Real sencillo	3,43 gr.	34 mrs.		
	1/2 real	1,715 gr.	17 mrs.		
	Carilla of 16 mrs. nominales	4,509 gr.	8 mrs.		
COPPER ("mill"	Cobre of 8 mrs. nominales	2,25 gr.	4 mrs.		
coin)	Cobre of 4 mrs. nominales	1,127 gr.	2 mrs.		
	Cobre of 2 mrs. nominales	0,563 gr.	1 mr.		

Note 1: The use of the thick old copper coin is forbidden in 1664 together with the small change. Note 2: One Molino coin mark mixed with silver = 12 reales; One mark = 230 grams.

2. TABLE SHOWING COIN EQUIVALENCES AFTER THE PRAGMATIC LAW FROM FEBRUARY 10, 1680

METAL	NAME	Nominal weight in grams	Equivalency in maravedis	Other equivalencies	Popular name
	Onza	27,04 gr.	4.080 mrs.	120 reales of silver	
ORO	Media onza	13,52 gr.	2.040 mrs.	60 reales of silver	Doble doblón
	2 escudos	6,76 gr.	1.020 mrs.	30 reales of silver	Doblón
	Escudo	3,38 gr.	510 mrs.	15 reales of silver	
	Real of 8	27,44 gr.	272 mrs.		Escudo of silver
	Real of 4	13,72 gr.	136 mrs.		1/2 escudo of silver
PLATA	Real of 2	6,86 gr.	68 mrs.		
	Real sencillo	3,43 gr.	34 mrs.		
	1/2 real	1,715 gr.	17 mrs.		
COPPER ("mill coin)	Carilla of 16 mrs. nominales	4,509 gr.	2 mrs.		
	Cobre of 8 mrs. nominales	2,25 gr.	1 mr.		
	Cobre of 4 mrs. nominales	1,127 gr.	1/2 mr.		
	Cobre de 2 mrs. nominales	0,563 gr.	1/4 mr.		

Note 1: One legal mill coin is reduced to one fourth; The rest of the fake mill coin -or made out of the Spanish reign- is reduced to one eighth.

Note 2: One mill coin mark mixed with silver = 3 reales.

3. TABLE SHOWING COIN EQUIVALENCES AFTER THE ROYAL BOND FROM MARCH 14, 1680

METAL	NAME	Nominal weight in grams	Equivalency in maravedis	Other equivalencies	Popular name
	Onza	27 04 ar	4.080 mrs.	120 reales of silver	
	Uliza	27,04 gr.	4.000 11115.	60 reales of	
ORO	Media onza	13,52 gr.	2.040 mrs.	silver	Doble doblón
	2 escudos	6,76 gr.	1.020 mrs.	30 reales of silver	Doblón
	Escudo	3,38 gr.	510 mrs.	15 reales of silver	
	Real of 8	27,44 gr.	272 mrs.		Escudo of silver
	Real of 4	13,72 gr.	136 mrs.		1/2 escudo of silver
PLATA	Real of 2	6,86 gr.	68 mrs.		
	Real sencillo	3,43 gr.	34 mrs.		
	1/2 real	1,715 gr.	17 mrs.		
	New piece of 2 mrs. (1)	6,21 gr.	2 mrs.		
COPPER (mill coin)	Carilla of 16 mrs. nominales	4,509 gr.	2 mrs.		
	Cobre of 8 mrs. nominales	2,25 gr.	1 mrs.		
	Cobre of 4 mrs. nominales	1,127 gr.	1/2 mrs.		
	Cobre of 2 mrs. nominales	0,563 gr.	1/4mr.		

Note 1: Pure copper coin.

Note 2: By this pragmatic law, the pure copper made coin is reduced to the same proportion and the rest mill coin made abroad is reduced to one fourth.

4. TABLE SHOWING COIN EQUIVALENCES AFTER DE PRAGMATIC LAW FROM MAY 22, 1680

METAL	NAME	Nominal weight in grams	Equivalency in maravedis	Other equivalencies	Popular name	
	Onza	27,04 gr.	4.080 mrs.	120 reales of silver		
ORO	Media onza	13,52 gr.	2.040 mrs.	60 reales of silver	Doble doblón	
	2 escudos	6,76 gr.	1.020 mrs.	30 reales of silver	Doblón	
	Escudo	3,38 gr.	510 mrs.	15 reales of silver		
	Real of 8	27,44 gr.	272 mrs.		Escudo of silver	
	Real of 4	13,72 gr.	136 mrs.		1/2 escudo of silver	
PLATA	Real of 2	6,86 gr.	68 mrs.			
	Real sencillo	3,43 gr.	34 mrs.			
	1/2 real	1,715 gr.	17 mrs.			
	New piece of 2 mrs.	6,21 gr.	2 mrs.			
COPPER (mill coin)	Carilla of 16 mrs. nominales Cobre of 8 mrs. nominales Cobre of 4 mrs. nominales Cobre of 2					

5. TABLE SHOWING COIN EQUIVALENCES AFTER DE PRAGMATIC LAW FROM OCTOBER 9, 1684

METAL	NAME	Nominal weight in grams	Equivalency in maravedis	Other equivalencies	Popular name
	Onza	27,04 gr.	4.080 mrs.	120 reales of silver	
GOLD	Media onza	13,52 gr.	2.040 mrs.	60 reales of silver	Doble doblón
	2 escudos	6,76 gr.	1.020 mrs.	30 reales of silver	Doblón
	Escudo	3,38 gr.	510 mrs.	15 reales of silver	
	Real of 8	27,44 gr.	272 mrs.		Escudo of silver
	Real of 4	13,72 gr.	136 mrs.		1/2 escudo of silver
SILVER	Real of 2	6,86 gr.	68 mrs.		
	Real sencillo	3,43 gr.	34 mrs.		
	1/2 real	1,715 gr.	17 mrs.		
	New piece of 2 mrs.	6,21 gr.	2 mrs.		
COPPER	Carilla of 16 mrs. nominales	4,509 gr.	4 mrs.		
(mill coin)	Cobre of 8 mrs. nominales	2,25 gr.	2 mrs.		
	Cobre of 4 mrs. nominales	1,127 gr.	1 mrs.		
	Cobre of 2 mrs. nominales	0,563 gr.	1/2 mr.		

Note 1: The restitution only affects to the legal mill coin mixed with sliver; the ban is maintained for the illegitimate.

6. TABLE SHOWING COIN EQUIVALENCES AFTER DE PRAGMATIC LAW FROM OCTOBER 14, 1686

METAL	NAME	Nominal weight in grams	Equivalency in maravedis	Other equivalencies	Popular name
	Onza	27,04 gr.	5.168 mrs.	152 reales of silver	
GOLD	Media onza	13,52 gr.	2.584 mrs.	76 reales of silver	Doble doblón
	2 escudos	6,76 gr.	1.292 mrs.	silver	Doblón
	Escudo	3,38 gr.	646 mrs.	19 reales of silver	
	Real of 8 of old silver	27,44 gr.	340 mrs.	10 reales of new silver	Escudo of silver
	Real of 4 of old silver	13,72 gr.	170 mrs.	5 reales of new silver	1/2 escudo of silver
	Real of 2 of old silver	6,86 gr.	85 mrs.	2,5 reales of new silver	
	Real sencillo of old silver	3,43 gr.	42,5 mrs.	1,25 reales of new silver	
SILVER	1/2 real of old silver	1,715 gr.	21,25 mrs.		
	Real of 8 of new silver	21,84 gr.	272 mrs.		
	Real of 4 of new silver	10,92 gr.	136 mrs.		
	Real of 2 of new silver	5,46 gr.	68 mrs.		
	Real sencillo of new silver	2,73 gr.	34 mrs.		
	New piece of 2 mrs.	6,21 gr.	2 mrs.		
COPPER	Carilla of 16 mrs. nominales	4,509 gr.	4 mrs.		
(mill coin)	Cobre of 8 mrs. nominales	2,25 gr.	2 mrs.		
	Cobre of 4 mrs. nominales	1,127 gr.	1 mrs.		
	Cobre of 2 mrs. nominales	0,563 gr.	1/2 mr.		

REFERENCES

Archives:

Archivo General de Simancas (A.G.S.) Simancas (Spain) Biblioteca Nacional (B.N.M.) Madrid (Spain)

Álvarez Nogal, C. (2001), "Los problemas del vellón en el siglo XVII. ¿Se consiguió abaratar la negociación del crédito imponiendo precios máximos a la plata?" *Revista de Historia Económica*, nº ext., pp 17-37.

Catalina Adsuara, A.R. (Ed.) (1980), Las monedas desde Alfonso X vistas por un ensayador de Felipe V. Madrid.

Collantes, E. and Merino, J. P. (1977), "Alteraciones al sistema monetario en Castilla durante el reinado de Carlos II" *Cuadernos de Investigación Histórica*, nº 1, pp.83-98

Domínguez Ortiz, A. (1978), "Algunas notas sobre banqueros y asentistas de Carlos II", *Hacienda Pública Española*, nº 55.

Domínguez Ortiz, A. (1960), *Política y Hacienda de Felipe IV*, Editorial de Derecho Financiero, Madrid.

Font de Villanueva, C. (2005), "Política monetaria y política fiscal en Castilla en el siglo XVII: un siglo de inestabilidades", *Revista de Historia Económica*, nº ext., pp. 329-347.

García de Paso, J.I. (2000), "La estabilización monetaria en Castilla bajo Carlos II", *Revista de Historia Económica*, nº 18/1, pp. 49-77

García de Paso, J. I. (2002), "The 1628 Castilian Crydown: A test of competing theories of the price level", *Hacienda Pública Española*, 163- (4/2002), pp. 71-91.

García de Paso, J.I. (2003), "La política monetaria castellana de los siglos XVI y XVII", En *La moneda en Europa de Carlos V al euro*. Pirámide. Madrid, pp. 101-136.

García Guerra, E. (1999), *Las acuñaciones de moneda de vellón durante el reinado de Felipe III*, Banco de España, Estudios de Historia Económica, nº 38.

García Guerra, E. (2003), *Moneda y arbitrios. Consideraciones del siglo XVII*, Madrid, CSIC.

Garzón Pareja, M, (1981), *La Hacienda de Carlos II*. Madrid. Instituto de Estudios Fiscales.

Gelabert, J. E. (1997), La bolsa del Rey, Barcelona, Crítica.

Hamilton, E.J. (1983), El tesoro americano y la revolución de los precios en España (1501-1650), Barcelona, Ariel.

Hamilton, E.J, (1988), *Guerra y precios en España, 1650-1800*. Madrid, Alianza Editorial.

Motomura, A. (1997), "New Data on Minting, Seigniorage and the Money Suply in Spain (Castile) 1597-1650", Explorations in Economic History, 34, pp. 331-367.

Nueva Recopilación de las Leyes de España, (1772), Madrid.

Sánchez Belén, J. A. (1992), "Arbitrismo y reforma monetaria en tiempos de Carlos II", *Espacio, Tiempo y Forma, serie IV Historia Moderna*, nº 5, pp., 135-176.

Sánchez Belén, J. A. (1996), La política fiscal en Castilla durante el reinado de Carlos II, Madrid, Siglo XXI.

Santiago Fernández, J. de (2000), *La política monetaria castellana del siglo XVII*, Junta de Castilla y León, Valladolid.

Sanz Ayán, C. (1989), Los banqueros de Carlos II, Junta de Castilla y León, Valladolid.

Sargent, T. and Velde, F. (2002), *The big problem of small change*. Princeton and Oxford.

Yun Casalilla, B. (2004), Marte contra Minerva, Barcelona, Crítica.