

## **Fiat Monetary Systems and the International Structure of Production**

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### **ABSTRACT**

Using the cause-and-effect framework of chains of actions, we provide an analysis of the changes in the quantity of money in an environment of two fiat monetary zones under floating foreign exchange rate regime. Following the approach of Hayek and Mises, we formulate a transmission mechanism of the international economic fluctuations caused by the monetary policy. Changes in the quantities of money might induce changes in the structures of production between the countries. In the case of countries with relatively high participation on the international division of labor, this might lead to significant decline in their economic activity.

Keywords: causality, foreign exchange rates, interspatial misallocation of production, monetary policy

JEL classification: B53, E22, E32, E42, E52, F31, F33, F41

## **Fiat Monetary Systems and the International Structure of Production**

### **Introduction**

Human life can be considered as a set of actions where one is pursuing attainment of desired ends (Mises 1996, pp. 11 *ff.*). These actions do not take place in a vacuum. On the contrary – each of them can be always defined in a specific *temporal* dimension and in a specific *spatial* dimension. Human beings are, to some extent, able to assess their actions with respect to these dimensions and also with respect to actions of other human beings. Correspondingly, to a higher or to a lower extent, people are able to plan attainment of their own ends as well as they are able to understand these plans in the context of other people's actions. Individual actions are therefore often interdependent: success or failure of an action of a person B might be conditioned by a success or failure of an action of a person A; and at the same time, success of B's action might determine success or failure of endeavors of a person C. Investigations of the present paper are on the claim that some of these interdependencies of individual interactions within the market economy are more “important” than other interdependencies. What do we mean by this?

Let us assume a city and its two traffic intersections. All people living in this city have to pass the first intersection in order to get to their work in the morning. In contrast, although a couple of people use the second intersection when commuting to the work, there are alternative routes that could be easily used instead. If on one day an unexpected traffic accident happens at the first intersection, many people will not make it to the work and many other people expecting their products will get upset. On the other hand, if something similar happens at the second intersection, the number of disappointed people will be barely noticed. In other words, unfulfilled expectations with respect to some types of interlinked interpersonal interactions lead to disappointments on much larger scales when compared to other types of interlinked interpersonal interactions.

Economics profession in general and Austrian economists in particular are aware of the fact that

one of the important “intersections” of the modern economic system is the structure of interest rates, i.e., prices at which people exchange present goods for future goods. Significant efforts have been put into understanding the relationship between economic activity and the interest rate determination (e.g.: Mises 1996, pp. 538-586; Rothbard 2004, pp. 989-1021; Soto 2005, pp. 265-508). Considering the amount of intellectual resources invested in the related research, one has a very good reason to ask what makes the interest rate so unique in comparison with other prices. The answer is that interest rate represents a price of a whole array of goods – present goods – with respect to another array of goods – future goods. A change in the interest rate therefore not only represents a change in a relative price of one good with respect to all other goods as it is in the case of a price of milk, potatoes or most other prices. On the contrary, change in the interest rate represents a change in the relative price of the whole group of goods *vis-à-vis* another group of goods. And since the interest rate has such a broad impact on the relative prices in the economic system as compared to the most of other prices, changes in the interest rate have much higher potential to lead to a large-scale disappointments of people when compared to changes of most of the other prices.

Interest rate, however, is not the only price that represents relative valuation of one broad array of goods with respect to another broad array of goods. As we have suggested in the beginning, human action has its *temporal* dimension, as well as its *spatial* dimension. While the interest rate clearly belongs to the realm of the *former*, there is another important price that is related with the *latter*. It is the *foreign exchange rate*, i.e., price that represents relative price of goods of one country with respect to goods of another country. Due to the same fundamental property, as explained in the case of interest rate – being a price ratio of two arrays of goods, foreign exchange rates have a similar potential to upset people's plans on a large scale. It will be precisely this “large-scale upsetting mechanism” characteristic of foreign exchange rates that will be put under the primary scrutiny in the present article.

## **The Context**

Given the strong emphasis that Austrian economists put on the issues of monetary economics, it is surprising how little they have contributed to the theory of foreign exchange rates. In fact, it is only Mises (1971), Hayek (2008), Salerno (1994), and White (1998) that would stand the criterion of an attempt to undertake an original treatment of the problem. And it was only the first two who included material for an analysis of a possible relationship between economic fluctuations and the existence of a flexible exchange rate regime between fiat currencies of two separate countries.

Although not providing a comprehensive discussion, Mises (1971) in this respect formulates two important points. First, he observes that the exchange rate is one of the first prices in the economy that tends to respond to changes in the quantity of money (Mises 1971, p. 214). This is closely related with the second point – the resulting cross-border redistribution of goods: it is the participants at the foreign exchange markets who get to the increased money balances among the first and who can purchase higher quantities of goods than otherwise. What is important, the redistribution is not restricted only to the residents of the country that issued additional money balances, goods are also redistributed across the border (Mises 1971, pp. 214, 205-206, 255-256).

Hayek (2008, pp. 367 *ff.*) brings two other important points. In the first, he introduces two institutional settings – the setting where two countries share the same currency, i.e., the case of a “homogenous international currency” (Hayek 2008, pp. 340 *ff.*), and the setting where each of the two countries has its separate currency, i.e., the case of “independent national currencies” (Hayek 2008, pp. 348 *ff.*). He then analyzes the case of a cross border change in a demand for a good in each of the two settings. In the case of a homogenous international currency, the effect of the change in the demand for the good is in the beginning relatively restricted and spreads step-by-step over the economy. The only markets that are directly affected include the market with the good towards which the individual shifts the demand and the markets from which the individual shifts this demand. By affecting the revenues of

the producers of these goods, the effect of the change in the demand spreads over the economy (Hayek 2008, pp. 353 *ff.*). In the case of independent national currencies, the situation differs: the change in the demand does not lead only to the direct change in the relative prices of a limited amount of goods. It is also directly related with a change in the foreign exchange rate, i.e., a change in the relative prices of domestic goods *vis-à-vis* foreign goods. As it is hardly possible that the new relative prices are in line with the preferences of individuals, the change in the demand for a single good serves as an impetus for series of changes in the relative prices of many goods in both countries (Hayek 2008, pp. 367 *ff.*). In the meantime, and this gets us to the second point we wanted to stress, some businesses are temporarily more profitable than otherwise and some businesses are less profitable than otherwise (Hayek 2008, pp. 372 *ff.*).

The four insights will represent the core background of our story. Using the framework of the Austrian capital theory, we will develop a transmission mechanism that explains how changes in the money supply lead to economic fluctuations in the case of two countries where each is under a separate fiat standard. We argue that the foreign exchange market is one of the first markets where the newly created money supply is usually used. If this happens, there is a sudden change in relative prices of goods of one country with respect to goods of the other country. For a limited period of time – until the adjustments of other prices take place, this opens new profit opportunities as well as makes some of the previous investments unprofitable. As a side effect, the whole process leads to a general impoverishment of the country that increases the money supply. It is important to note that our story is not competing with the Austrian business cycle theory, it is rather proposed as its complement for a specific, however, nowadays very common, institutional setting.

The organization of the rest of the paper is as follows. First, we comment on the concept of “chains of actions” that is used throughout the text. Second, we explain why it matters to investigate the institutional setting of two countries where each country has its own fiat currency. Third, we show

the mechanisms following an increase in the money supply within this setting. Fourth, we discuss the reasons why the newly created money supply enters the foreign exchange market as one of the first markets. Fifth, we formulate the basic concepts of the capital theory. Sixth, we explain the mechanisms of economic fluctuations related with the increases in the money supply within the institutional setting of independent fiat national currencies. Seventh, we formulate conclusions.

### **Individual chains of actions and foreign exchange rates**

An individual and his actions are the basic cornerstones of the present analysis. Individual is equipped with means and he pursues actions in order to attain desired ends in a more or less distant future<sup>1</sup>. These actions necessarily follow the causal laws of the world<sup>2</sup>: individual's actions have a step-by-step nature and, as it was said in the introduction, they have specific time dimensions and specific space dimensions (Soto 2005, p. 269). What is important, in the course of pursuing his plans to attain an end, an individual can, at given point, often decide to change his future actions, i.e., to amend his plans.

In this respect, and for the purposes of our analysis, we will talk about “chains of an individual's actions”<sup>3</sup>. *Ex ante*, chain of an individual's actions represents actions that, at least in the eyes of the individual concerned, lead from a given state of affairs towards attainment of an end. *Ex post*, the chain of an individual's actions represents the steps that were actually undertaken. In our framework, we divide this chain into *links*. Each *link* represents a *cluster of states of the world* induced by human action that, once started, cannot be prevented from accomplishment. Temporal and causal end of each such a link represents, on the other hand, an opportunity for an individual to revise his plans; while at the same time it is the beginning of another link.

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1 On the fact that our actions are always future-oriented see Mises (1996, pp. 100-101), or Soto (2005, pp. 266 *ff.*).

2 First sentences of Menger's Principles are illuminating in this respect: “All things are subject to the law of cause and effect. This great principle knows no exception, and we would search in vain in the realm of experience for an example to the contrary.” in Menger (1994, p. 51). *Cf.* Mises (1996, pp. 22-29).

3 The use of the terminology of “chains” was inspired by Hayek (2008). See also Mises (1996, pp. 45 *ff.*).

While each “individual's plan” represents a mental picture of a particular “chain of individual's actions” which is put within a broader context of the real world, it would be incorrect to infer that the concept of “chain” is nothing but a synonym of the concept of “plan”. While *ex ante* it is true for every plan and related expected chain of actions, it does not necessary hold *ex post* – in retrospection of actually performed given chain of actions. As mentioned above, since individual may revise his decisions, the links of the actual chains of actions that individual undertakes in the real world do not all necessary have to follow one given plan. *Ex post*, any of the links of the same chain therefore can – and often does, follow a different plan<sup>4</sup>. The concept of the “chain of individual's actions” is therefore introduced in order to stress the presence of two particular facts in our further discussion. First, that individuals make and revise decisions over the course of time. And second, that these revisions cannot always be done instantaneously with individuals' changes of preferences and opinions about the best way to achieve given ends.

The concept of individual's chains of actions can easily be reconciled with the world of multiple individuals where the actions are interpersonally interdependent. If an individual pursues a chain of actions that comprises an interaction with another individual pursuing his chain of actions, there is an overlap in chains of actions of the two individuals. In other words, these chains are interrelated.

The phenomenon of foreign exchange rate – the price of one currency in terms of another currency – is an example of such interpersonally interrelated chains of actions. In this regard, it is important to stress two points. First, an exchange of currency X for currency Y is dependent on the consent of would-be sellers of X with would-be sellers of Y. Second, we know that an interpersonal

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4 This could be clarified with the following example: Let us say that Will in the time period t0 chooses to put an apple seed into the ground in expectation of obtaining apples in the period t3. In the period t2, however, his arch enemy king Nicholas unexpectedly strikes his village and Will decides to cut the tree and to make a pike from the wood. In the period t3, terrified Will is dying on the battlefield committing suicide with the pike. If we take this as a model situation with only three links, the *ex post* examination of the chain of Will's actions shows that although in each point when the decision was made (seeding, cutting, committing a suicide) Will always planned a particular chain of actions, in all three cases these planned chains did differ and that the resulting chain of actions consists of links where each link corresponds to a different plan with a different end, i.e., eating apples, killing king Nicholas, committing a suicide.

exchange of X for Y is, on the one hand, a manifestation of the existence of individual or individuals holding currency X who see desirable chains of actions that start with possession of currency Y, and, on the other hand, it is a manifestation of the existence of other individual or individuals holding currency Y who see desirable chains of actions that start with possession of currency X. Given these two points together, we can say that there is a link in chains of actions of those selling X that is dependent on the link of chains of actions of those selling Y and *mutatis mutandis* the other way round. In other words, foreign exchange rate clearly is an example of interpersonally interrelated chains of actions.

### **Homogenous international currency versus the system of independent fiat national currencies**

After the discussion of the analytical tool, we can now turn to the assessment of the significance of floating exchange rate regime within the framework of independent fiat national currencies and active monetary policies. We will follow Hayek (2008) and contrast this scenario of independent fiat national currencies with the case of homogenous international currency.

Let us first assume existence of a single country called Alfania where individuals use one fiat currency, Alfanian dollar (\$). For the sake of the present argument, we assume that the Alfanian monetary authority keeps the quantity of money in the economy intact. As mentioned, all actions of individuals – including those individuals living in Alfania – could be described within the framework of chains of actions. As actions are often interdependent, we can imagine the Alfanian society as a network of interlinked chains of actions. Although this framework can be traced in all types of social interactions, we would like to answer the following question: What happens if individual's market

demand for product  $A_1^{\alpha 5}$  - let it be apple in our example – is higher than otherwise?<sup>6 7</sup>

Let us now discuss a case of an ordinary inhabitant of Alfania – Shruti. To say that Shruti's demand for apples is higher than otherwise is the same as to say that Shruti's demand for other goods – let us call them  $B_1^{\alpha}$  (bananas) – is lower than otherwise. We will first focus on the implications related with apples, thereafter the case of bananas will be considered.

Shruti's change in the demand means that the price of apples is higher than otherwise and that the revenues of sellers of apples are higher than otherwise. Correspondingly, further chains of actions of these sellers are related with expenditures higher than otherwise. The same principle is in the respective temporal order applied to the benefactors of this increased spending. In other words, if the seller of apples receives \$20 instead of \$5, he is able to purchase not only bread, but also some butter. As a consequence, the sellers of butter have higher revenues by \$15 and are able to purchase additional pair of shoes, and so forth. At the same time, there is also a group of people who as a consequence of Shruti's action and relative increase in the price of apples do not purchase apples at all or purchase apples in lower quantities than otherwise. Change in their behavior leads to corresponding additional setp-by-step effects spreading over the economy. The same principle *mutatis mutandis* applies to all people who are affected by the changed purchases of benefactors of Shruti's increased demand for apples.

We will now turn the attention to the case of bananas. The price of bananas is lower than otherwise as are the revenues of their sellers. Their chains of actions are related with correspondingly lower expenditures than otherwise and these lower expenditures are further transmitted via related

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5 The superscript represents the country for currency of which the good is directly purchased: “ $\alpha$ ” stands for Alfania and “ $\beta$ ” will in the later discussion stand for Betania. The letter and the subscript define the type of good.

6 In our discussion, we will deal explicitly only with the problem of the counterfactual *increase* in the demand for apples and not with the *decrease* in the demand for apples. The reason is that the reasoning related with the counterfactual *decrease* in the demand for a good is already implied: an *increase* in the demand for good A at the same time represents a *decrease* in the demand for its substitutes. The case of a decrease of a demand for a good is therefore already included in the discussion.

7 Cf. the second lecture in Hayek (2008, pp. 353-359).

chains of actions of other people with revenues lower than otherwise. In our case, Shruti spends \$15 less on bananas than otherwise and banana sellers have to undertake a relative restriction in their expenditures by \$15. Their affected suppliers have to do the same and so forth. As it was also in the case of apples, the changed behavior affects also other market participants who now face different set of prices than otherwise which set in motion additional step-by-step changes.

The above exercise was undertaken to stress a single important point: change in one's preferences within the framework of a homogenous international currency has *initially a direct systematic influence on specific groups of individuals*: buyers and sellers of the good in question – in our case apples ( $A_1^a$ ) – and buyers and sellers of the substitutes of the good in question – in our case bananas ( $B_1^a$ ). It is only chains of actions of these individuals that are systematically and directly affected by the change in preferences related with the good in question. And only these changed chains of actions then lead in a systematic way – via expenditures different than otherwise – to consecutive changes in chains of actions of other people. In other words, it is the price of the good in question that represents the “centre” from which, as a consequence of the change in the preference for this good, further changes of revenues and expenditures spread around the economy<sup>8</sup>.

Let us at this point move a step further and change our assumptions<sup>9</sup>: we divide Alfania into two countries – Alfania and Betania, each having a separate fiat currency. While Alfanians use dollar (\$), Betanians use pound (£), implying goods sold on the Alfania soil are directly sold for dollars only; and that goods sold on the Betania soil are directly sold for pounds only. The dollar is the “domestic currency”, pound is the “foreign currency”. Unless stated otherwise, the exchange rate is expressed in what is usually referred to as the “direct quotation” from the point of view of the dollar holders – number of dollars per one pound (\$/£). The dollar appreciates when the exchange rate declines, for

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8 We do not deny that there could be psychic incentives, that include expectations, that might induce some people who are not (or not yet) directly related with spreading changes in expenditures to change their own behavior. However, one could hardly call such changes in behavior systematic: it could happen as well as it does not have to.

9 Cf. the third lecture of Hayek (2008, pp. 367-383).

example from 2\$/£ to 1\$/£, and depreciates with the rise of the exchange rate, for example from 3\$/£ to 5\$/£<sup>10</sup>.

Assuming that apples,  $A_1^\beta$ , are now being sold in Betania and that Shruti is a dollar holder living in Alfania, we again introduce Shruti's counterfactual increase in her demand for apples. The chain of actions related with the increased demand in this case comprises of at least two links – first, purchase of pounds, and second, purchase of apples<sup>11</sup>. Demand for apples that is higher than otherwise therefore does not lead only to counterfactual increase in the pound price of apples, it also necessary leads to counterfactual increase in the price of pound, i.e., to relative depreciation of the dollar (Hayek 2008, pp. 369-370).

Let us first take a look at the immediate consequences matching the dynamics followed in the case of a homogenous international currency. Increased expenditure on apples again means that there are chains of actions with spending different than otherwise related with the increased revenues of the sellers of apples. Following the same line of the argument, there are people who are in the step-by-step manner described above affected by Shruti's relative decrease in the spending on bananas.

This story has essentially been the same as that of the homogenous international currency. The story is, however, not over. Let us introduce Harry, an inhabitant of Betania, who purchases Shruti's dollars for pounds, and David, an inhabitant of Alfania, who participates at the foreign exchange market.

Having relatively lower amount of pounds, Harry has to have lower purchases of some of the

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10 Although it is not the topic of the present article, one might ask what determines the exchange rate of two fiat currencies. This question is in a close relationship with another one: What is the reason of obtaining a fiat currency, i.e., to make obtaining of the currency part of one's chain of actions? There is only one reason why one desires a fiat currency: it is use of this currency at some point in the future in order to purchase goods (Mises 1996, pp. 408 *ff.*; Mises 1971, pp. 108 *ff.*; Rothbard 2004, pp. 268 *ff.*). It is these obtainable goods that stand for the basis of our valuation of the fiat currency. And since it is prices that determine amounts of goods that could be obtained for the given currency, expected prices of these goods are always one of the determinants of individual's subjective valuations of the fiat currency (Mises 1971, pp. 97 *ff.*). There is no reason why this general principle should hold less at the foreign exchange markets than at all the other markets.

11 It is clear that Shruti does not have to perform all the necessary steps herself in person, she could hire intermediaries.

Betanian goods  $A_2^\beta$  than otherwise. On the other hand, Harry's dollar holdings are higher than otherwise and therefore his purchases of Albanian goods  $B_2^\alpha$  are higher than otherwise. Correspondingly there are chains of actions of relatively decreased pound spending related with the relatively decreased revenues of the sellers of  $A_2^\beta$  on the one hand, and there are also chains of actions with dollar spending higher than otherwise related with the higher revenues of the sellers of  $B_2^\alpha$ . The same type of the story that was described for the case of Shruti and the induced step-by-step changes caused by her actions on the market for bananas and by her actions on the market for apples therefore applies to the case of Harry.

The foreign exchange rate higher than otherwise also has an effect on David. As a result of a change in the relative price of foreign goods and domestic goods, he might decide to change spending on a set of Betanian goods  $A_3^\beta$  and on a set of Albanian goods  $B_3^\alpha$ . This is followed by the same type of step-by-step consequences as in the the case of Shruti and Harry.

It is now important to be clear on the differences between the two cases discussed above: the case of a change in a demand for apples under the homogenous international currency; and the case of a change in a cross-border demand for an apples assuming the existence of two independent fiat national currencies.

In the case of homogenous international currency, the change in the demand for a good is directly followed by relatively only a few analytically traceable initial influences on further actions. If  $A_1^\alpha$  is more preferred to  $B_1^\alpha$  than otherwise, first, price of  $A_1^\alpha$  is higher than otherwise as well as the revenues of the sellers of  $A_1^\alpha$ , and, second, price of  $B_1^\alpha$  is lower than otherwise as well as the revenue of the sellers of  $B_1^\alpha$ . This reasoning could be respectively applied to all related changed chains of actions. The important fact is that analytically, there are only two systematic “centers” of change –  $A_1^\alpha$  and  $B_1^\alpha$ .

In contrast, the similar case of a change in a demand for  $A_1^\beta$  in the system of two independent fiat national currencies comprises not only of the same type of influences as those of the case of

homogenous international currency, i.e., those already described for the goods  $A_1^{\alpha}$  and  $B_1^{\alpha}$  and respective revenues for their sellers and related changes in chains of actions. In addition, there are four other other analytically distinct “centers” of change –  $A_2^{\beta}$ ,  $B_2^{\alpha}$  (Harry) and  $A_3^{\beta}$ ,  $B_3^{\alpha}$  (David).

In other words, we have showed that the two cases – with and without foreign exchange rate – are qualitatively different; that a cross-border change in demand in the latter case is directly and systematically related with effects that do not arise in the former case. It is, however, important to show that this qualitative difference has in the present-day monetary systems also quantitative significance. In other words, that a cross-border relative change in demand has a potential of relatively affecting relatively many individuals in both countries and that a decision of one Shruti influences many other “Harrys” and “Davids” in both countries and consequently creates many initial “centers” of change similar to those described above.

This conclusion is very plausible if transactions with foreign exchanges are strongly interrelated: if the majority of foreign exchange transactions have potential to affect prices of many other transactions at the foreign exchange market they can indirectly affect many, otherwise unrelated, chains of actions. Since this assumption is not very controversial in the light of the present-day highly centralized markets with foreign exchange, we will keep the assumption from now on. It is, however, important to stress its meaning: it says that a change in a preference expressed across the border has a potential to change relative prices of all Alfanian goods with respect to all Betanian goods. For example, Shruti's relatively increased demand for Betanian apples discussed above means that all chains of actions of dollar-holders related with purchases in Betania, like that of David, are suddenly more expensive than otherwise; and at the same time, that all chains of actions related with purchases of Alfanian goods are for the holders of pounds, e.g., for Harry, suddenly less expensive than otherwise.

After the clarification of the significance of the institution of the foreign exchange rate, it is also important to stress another issue that has been in the background of the previous analysis: the passage

of time in the light of the step-by-step processes that is investigated. While the change in the exchange rate that makes all Albanian goods relatively cheaper to the Betanian goods occurs in one stroke, the adjustments in prices of Albanian goods that spreads from the sellers of  $B_2^a$ ,  $B_3^a$ , and those alike, take time. It is a process that is constrained by advancement of changed individual purchases over the Albanian economy. The opposite pattern of the same nature can be observed in Betania – the sudden increase in the relative price of all Betanian goods is adjusted only by the step-by-step process of the changed revenues spreading from the sellers of  $A_2^b$ ,  $A_3^b$ , and those alike. Again, this process takes time. For some time, the described change in the relative demand for good  $A_1^b$  therefore creates a systematic pattern of change of relative prices of the two clusters of goods – between the foreign goods and the domestic goods. Only the passage of time – as the impulses related with  $A_2^b$ ,  $A_3^b$  and  $B_2^a$ ,  $B_3^a$  spread over actions of Albanians and Betanians respectively – brings about the erosion of this general change in the relative prices<sup>12</sup> (Hayek 2008, pp. 370-373).

There is a multiple of possible reasons why Shruti might increase her demand for the foreign goods and bring about similar effects to the ones explained above, but there is one that is interesting for us in particular: Albanian monetary expansion.

### **Changes in the money supply in the regime of two independent fiat national currencies**

While referring to the changes in the quantities of money within the framework of chains of actions, one always refers to changes in cash-balances of particular individuals<sup>13</sup>. It is then clear that the way in which this change affects the economy is determined by the changes in chains of actions that follow. In

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12 It should be stressed that we do not claim here that the relative prices somehow return to the same previous relative proportions as they were before the change in Shruti's valuation. Changes in other variables and redistributions that were linked with the previous process both suggest that this is not the case. Our claim is rather that the general pattern of decrease in the price of domestic goods with respect to the foreign goods is at some point reversed.

13 “[V]ariations in the value of money always start from a given point and gradually spread out from this point through the whole community. And this alone is why such variations have an effect on the social distribution of income.” Mises (1971, p. 207). See also Mises (1971, pp. 206 ff.) and Mises (1996, pp. 416 ff.).

the analysis below, we discuss a case of counterfactual increase in the quantity of money<sup>14</sup>.

What are the consequences of an increase in the quantity of money? To follow our example of two independent fiat national currencies, let us assume that Shruti becomes an owner of Alfania's central bank and prints some additional money. What are the consequences of Shruti's cash-balance being higher than otherwise? The immediate result is that Shruti's marginal value of money is lower than otherwise. We assume that this leads her to have relatively higher dollar expenditures<sup>15</sup>. Consequently respective step-by-step counterfactual increases of people's expenditures spread over the economic transactions. In contrast with the situation discussed above, since the increase in the demand for the good does not have to be balanced by respective relative decrease in Shruti's demand for other goods – it is paid out of the additional money supply, the systematic effect of the counterfactual price-increases is put into motion over the economy. It should be clear that this process is of a redistributive character: people who receive the additional money sooner are able to purchase relatively higher quantities of goods than those who compete for the same goods but whose revenues have not yet been affected by the chain of increased spending (Mises 1971, pp. 137 *ff.*). Shruti's increased purchases of goods as well as increased purchases of goods by the people who receive the increased revenues relatively sooner is therefore offset by lower amounts of goods purchased by less fortunate people.

We can now move a step further and analyze the consequences of spending of the increased money supply on a foreign good. Following the story above, let us assume that Shruti spends part of her cash balance that represents the relative increase in the money supply on Betanian apples.

The counterfactual consequences are very similar to the already discussed case of Shruti's changed preferences while holding the quantity of money unchanged: there is the increase in the pound

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14 The case of the counterfactual decrease in the quantity of money will be omitted in the present treatment. Its consequences, however, can be derived *mutatis mutandis* with use of the same reasoning as is developed for the case of the counterfactual increase in the quantity of money.

15 To be precise, it could be the case that Shruti keeps all the additional money in her pocket. However, since the effects that are related with the analysis of the present paper are dependent on spending of this additional quantity of money, we will discuss only this version of the story.

price of apples and the related effects of increased revenues and expenditures spreading step-by-step over chains of actions of Betanians; there is the decrease of the prices of Betanian  $A_2^\beta$  and  $A_3^\beta$  and the related step-by-step decreases in prices and revenues over Betania; there is the depreciation of the dollar; and there is the increase of the prices of Alfanian  $B_2^\alpha$ , the change in price of  $B_3^\alpha$  and the related changed prices and revenues gradually spreading over chains of actions of Alfanians. There is one difference in this story, however. The consequences related with the decreased demand for Alfanian bananas are missing. Shruti does not have to restrict her banana-consumption due to her increased purchases of apples. As a consequence, no effects of decreases in prices and revenues that would gradually spread over the actions of individuals in Alfania are directly related with Shruti's decision to purchase apples.

From an aggregate point of view that would disregard the element of time and the step-by-step processes of actions discussed above, one might decide to wrap up the analysis with conclusions that the whole change in the money supply leads just to (a) a relatively higher Alfanian price level and to (b) a relatively depreciated Alfanian dollar.

Such a conclusion would be superficial, however. *On the one hand*, Shruti's action, i.e., the action of the monetary authority, caused a *sudden* change in the relative price of the Alfanian goods with respect to the Betanian goods: since one Betanian pound *suddenly* buys more Alfanian goods than otherwise, Alfanian goods are relatively less expensive than Betanian goods. This means that new profit opportunities are opened to those whose chains of actions incorporate buying in Alfania and selling in Betania, i.e., to Betania's "importers" and Alfania's "exporters"<sup>16</sup>. *On the other hand*, the

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16 „As soon as an uncompleted change in the objective exchange value of any particular kind of money becomes expressed in the foreign-exchange rates, a new opportunity of making a profit is opened up, either for exporters or for importers according as the purchasing power of money is decreasing or increasing. Let us take the former case, that of the diminution in the value of money. Since, according to our assumptions, the changes in domestic prices are not yet finished, exporters derive an advantage from the circumstance that the commodities that they market already fetch the new higher prices whereas the commodities and services that they want themselves and, what is of particular importance, the material and personal factors of production that they employ, are still obtainable at the old lower prices.“ Mises (1971, p. 214).

counterfactual price-increases in Alfania that erode the change in the price differentials between Alfania goods and Betanian goods *take time*.

The fact that the two effects described above take place at a different speed – one instantaneously and the other one gradually, however, in our view does not only mean that there is a redistribution in favor of “importers” and “exporters”, quite the contrary. We will later argue that under specific circumstances, this institutional setting together with increase in the money supply leads to economic fluctuations. But before we will get to the core of this problem, it is important to realize that a one-shot increase in the money supply leading to a short-term price differential that is described above can hardly lead to changes in decisions of producers that would be related with significant economic fluctuations. If the cross-border price differential induced by a change in the exchange rate does not arise for a longer period of time, or represents just a one-day fluctuation as the additional amount of money is then transmitted to other markets, we can hardly argue for a more significant effects related with the existence of the foreign exchange markets. It is therefore necessary to look at mechanisms that explain some degree of persistence of the price differential described above.

### **Expansionary monetary policy and persistence of the price spread between domestic goods and foreign goods**

Our problem can be re-stated in two questions. First, how can be the increased foreign-domestic price differential kept for a longer period of time? And second, why should the relative increases in the money supply end up relatively sooner at the foreign exchange market rather than at other markets?

The first question is relatively easy to answer: if the monetary authority continually increases the money supply, the resulting step-by-step redistributive effects described above are repeated again and again keeping thus the benefits for those who get their hands on the newly created money relatively

sooner<sup>17</sup>. If the relative increases of the money supply are spent at the foreign exchange market rather than at the other markets – as it was assumed in the individual case of Shruti, there is a tendency to keep the artificial price differential between domestic goods and foreign goods.

This brings us to the second problem – why do we assume that it is the foreign exchange market that is affected relatively sooner compared with other markets of the Alfania economy? Our argument is two-fold and empirical, implying that it is conditioned by assumptions of how the monetary system in question is organized.

First, in order to affect the foreign exchange market, it is sufficient for an individual with relatively higher expenditures to purchase *any* Betanian good that he would not purchase otherwise. In contrast, in order to affect a price of any Alfania good or revenues of its seller, one has to make a purchase that would not be made otherwise and that is specifically related with chains of actions that lead to the purchase of this *particular* good. In other words, it does not matter whether Shruti intends to buy with her newly printed money Betanian apples, Betanian pears, or Betanian raincoat, the immediate effect with respect to the foreign exchange market is the same. On the other hand, regarding the price of a particular domestic, i.e., Alfania, good, it matters greatly which good Shruti buys with the newly printed money in case that she decides to spend it in Alfania: it matters for the particular prices of Alfania goods whether Shruti buys, for example, Alfania chicken instead of Alfania cow. And, what is important for us, increased expenditure on one good instead of on another good means that the relative price of the former increases sooner when compared to the latter; or “speeding up” of counterfactual price increases of one group of goods means “slowing down” of counterfactual price increases of other goods. Assuming that a significant fraction of one's expenditures is spent on foreign

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17 „The ‘beneficial effects’ on trade of the depreciation of money only last so long as the depreciation has not affected all commodities and services. Once the adjustment is completed, then these "beneficial effects" disappear. If it is desired to retain them permanently, continual resort must be had to fresh diminutions of the purchasing power of money. It is not enough to reduce the purchasing power of money by one set of measures only, as is erroneously supposed by numerous inflationist writers; only the progressive diminution of the value of money could permanently achieve the aims which they have in view.“ Mises (1971, p. 224).

goods, it is not unjustified to claim that it is very probable that the foreign exchange market is affected by increased quantity of money relatively sooner than most of the other markets in the economy in question.

In the economy that significantly participates in the international division of labor, which is the case in most of the modern economies, it is therefore very probable that any person's relatively higher expenditure caused by respective increase in the money supply leads very quickly to someone's purchases of the foreign currency that are higher than otherwise. On the other hand, it is much less likely that the increased expenditure leads as quickly to a change in purchase of every other good produced in the country in question. The reason is, as argued, that purchases of some of these *individual domestic* goods are embodied much less in the chains of actions of individuals when compared to the *foreign goods in general*.

The second argument was proposed by Mises (Mises 1971, p. 214 and p. 250; Mises 1996, pp. 455-456; Mises 2000, p. 76; Mises 2002, p. 35). He argued that in the present monetary system, changes in the quantity of money, and changes in the prices of money in general, tend to manifest themselves much sooner in the foreign exchange market when compared with other markets<sup>18</sup>. This is given by the infrastructure of the contrasted markets – it is much easier to take speculative positions at the foreign exchange markets than at most other markets. Relative increases in the domestic money supply therefore leads to the relative depreciation of the domestic currency prior to the changes in most of the other prices.

Having presented our underlying assumptions – continuous increases in the country's, in our

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18 "Under the modern organization of the monetary system this adjustment [of the prices of the commodities concerned in international trade to the new value of money] is usually first made on the Stock Exchanges. Speculation on the foreign-exchange and security markets anticipates coming variations in the exchange ratios between the different kinds of money at a time when the variations in the value of money have by no means completed their course through the community, perhaps when they have only just begun it, but in any case before they have reached the commodities that play a decisive part in foreign trade." Mises (1971, p. 214). Later on, he repeats the argument: "[T]he determination of foreign-exchange rates, under the influence of speculation, anticipates the expected variations in the prices of commodities." Mises (1971, p. 250).

case Alfania's, money supply and relatively high involvement of the country in the international division of labor, we are now getting closer to the main point of our analysis: discussion of effects of the expansionary monetary policy on the economic activity and production of related countries, in our case of Alfania and Betania. But to be able to solve the problem, we have to discuss two last key concepts of the analysis – the structure of productions and the unsustainability of a production.

### **Consumption and the structure of productions**

In the most general meaning of the word, production can be understood as a manifestation of any purposeful human activity. In the modern capitalist society based on the division of labor, the meaning is usually more restricted; production is an interaction of individuals within the framework of the market that eventually leads to consumption good. It is this restricted meaning that we use.

A participating individual contributes to a given production only to a limited extent: services of his factor of production are usually not employed during the overall length of the production nor they represent all the necessary inputs. Every final consumption good is therefore a result of interlinking and overlapping chains of actions of many individuals and their factors of production. The chains of actions of some of these individuals might, at a given time and place, enter and represent the production; and at another given point these individuals might leave the production, being superseded by contribution of other individuals and their factors of production.

Although not always performed by the same individual, one type of a chain of actions moves like a thread along every stage of each production: it is a chain of actions of an entrepreneur (Mises 1996, pp. 327 *ff.*). It is the entrepreneur who coordinates individuals; it is the entrepreneur who decides to sell intermediary good to some other entrepreneur; and it is the entrepreneur who makes decisions about selling of the final consumption good to a consumer.

As we have already noted, an individual usually helps to transform a product only from one

intermediate stage to another intermediate stage (Hayek 2008, pp. 231 *ff.*; Soto 2005, pp. 291 *ff.*): the result of his action is not a consumption good but just another factor of production. Revenue from services of the factor owned by an individual is, however, often in terms of present consumption goods. Such an individual then has to be paid out of savings (Soto 2005, pp. 273 *ff.*): there has to be someone who has a right to present consumption goods and who is willing to transfer this right to the producing individual (Soto 2005, p. 277; Strigl 2000, pp. 61 *ff.*). Receiving his revenue at a particular point, it is every individual who decides about saving and consumption. If he decides to consume, he increases his demand for present consumption goods. If he decides to save, he puts forward a new chain of actions that is related with deciding whether to consume or whether to save for some future point. This chain ends with a decision of spending the funds for consumption goods at a future point or a future set of points.

We therefore have two types of decisions being made. First, the entrepreneurial decisions about the production processes where different decisions mean different amounts of consumption goods in different points in the future. Second, the decisions of the recipients of incomes about their willingness to consume at later and sooner points in time. We ask whether the sets of the two types of decisions do not contradict each other, whether the given structures of productions are sustainable. In other words: does a given arrangement of a flow of consumption goods in time contradict desires of recipients to spend their incomes over time or not?

Let us consider all planned productions in an economy. One of these productions leads to a certain quantity of consumption goods A at a specific point in the future. We pick an arbitrary point in time somewhere between the beginning of production and the completion of consumption of A. There are two options with respect to the remaining part of the production: either the factors of production that are necessary for finishing of A can be provided with a sufficient amount of consumption goods during the whole period of the production process, or the factors cannot be provided with the

consumption goods. The latter means that the owners of the factors of production that are necessary in production of A have an opportunity to earn higher income in alternative productions.

To look at the problem in more detail, we can imagine a point in time – *time 1*, and a person – First Entrepreneur. First Entrepreneur supervises production of an intermediate product and he is willing to sell this product at *time 2* to Second Entrepreneur. At *time 3*, after finishing his set of contributions, the Second Entrepreneur is willing to sell the finished consumption good A to consumers. This is the plan for the production of good A at *time 1*.

Let us now consider the situation of First Entrepreneur at *time 1*. Under what conditions does he think that the production is sustainable? In the first step, he has to discount the expected value of the revenue from the sale at *time 2*. Second, he has to consider expected costs incurred between *time 1* and *time 2* and discount these costs to *time 1*. Only if the expected difference between the discounted revenues and the discounted costs is sufficiently high, First Entrepreneur decides to start the production at *time 1*. The important factors for First Entrepreneur therefore are: the magnitude of costs, the interest rate, and the price that is to be paid for the intermediate product by Second Entrepreneur at *time 2*. We know that costs represent alternative uses of the factors of production. We also know that the interest rate is determined by consumption and savings decision of individuals who have rights to purchase consumption goods between *time 1* and *time 2*. And the willingness of Second Entrepreneur to pay for the intermediate product is determined by the difference between his discounted revenues from the sale of consumption goods A at *time 3* and the discounted value of costs incurred between *time 2* and *time 3*. The production decision of First Entrepreneur therefore depends on costs of the factors of production that are to be employed between *time 1* and *time 3*; on the interest rate between *time 1* and *time 3*; and on the expected price of the consumption good A at *time 3*.

We have to stress that it does not matter for the conclusions whether, as it is in the previous example, there is only one contributing entrepreneur employed in the production process between First

Entrepreneur and the sale of the consumption good; or whether there are more intermediary entrepreneurs. In case that there are  $N$  entrepreneurs involved, the price that the  $N^{\text{th}}$  Entrepreneur is willing to pay to the  $N-1^{\text{th}}$  Entrepreneur is determined by the costs incurred between *time N-1* and *time N*; by the interest rate between *time N-1* and *time N*; and by the price of the consumption goods at *time N*. In the following step, the price that the  $N-1^{\text{th}}$  Entrepreneur is willing to pay to the  $N-2^{\text{nd}}$  Entrepreneur is determined by the costs incurred between *time N-2* and *time N-1*; by the interest rate between *time N-2* and *time N-1*; and by the price paid for the intermediary product by  $N^{\text{th}}$  Entrepreneur at *time N-1*. Following this logic, we can generalize our conclusion from the previous paragraph: the production decision of First Entrepreneur depends on costs of the factors of production that are to be employed between *time 1* and *time N*; on the interest rate that is to hold between *time 1* and *time N*; and on the expected price of the consumption good A at *time N*. If the expected revenues are sufficiently high and interest rate as well as costs sufficiently low, the First Entrepreneur might decide to start the production.

In the previous set of paragraphs, we have discussed which factors determine whether First Entrepreneur decides to go ahead with the production. We will now move a step further and ask: Under what circumstances is the planned production finished? For each entrepreneur who participates in the production, there exists a chain of actions that represents his decisions of whether to continue in the process or not. In each of these actions, the model situation of the First Entrepreneur that is discussed above is repeated. Entrepreneur asks: given the expected revenue, expected cost and the interest rate, does it pay to continue production? Only if the answer of all involved entrepreneurs at all relevant points is affirmative, the production can be finished as planned.

After the analysis of the basic features of a sustainable production, we would like to discuss changes in the structure of productions. We can consider two cases: first, the case of un-sustainability of a production of a good (Hayek 2008, pp. 253 *ff.*; Soto 2005, pp. 348 *ff.*); and second, the case of

underproduction of a good. We say that a production is unsustainable if an entrepreneur at some point cannot continue in the planned production. This means that the quantity of the consumption goods resulting from the given production plan is too high. The case of underproduction is just the flip side of the un-sustainability coin: the production of a given quantity of consumption good A is unsustainable because there are more profitable productions of a set B of other consumption goods. Demands for B goods are too high to be consistent with the given production of A. As a consequence, A is not produced in the quantities according to the initial plan and B is produced in higher quantities than otherwise. Given the close relationship between the two concepts, we will discuss only the case of an unsustainable production.

So what does it mean that a production is unsustainable? To continue in our example, let us start with the entrepreneur on a specific date, *time X*. He is just deciding about the production that eventually leads to a certain quantity of consumption goods A on a specific date in the future, *time X+Y*. Entrepreneur considers the production to be unsustainable: the expected present value of the price that individuals are willing to pay for the given quantity of A is insufficient when compared with the expected present value of the respective costs. This is caused by higher demands for other consumption goods. We discuss three analytically separate options in this respect: (a) the demands for consumption goods finished between *time X* and *time X+Y* are higher than it is compatible with the given production of goods A; (b) the demand for alternative consumption goods finished at *time X+Y* is higher than it is compatible with the given production of A; and (c) the demand for consumption goods produced after *time X+Y* is higher than it is compatible with the given production of A.

(a) Demands for a set B of consumption goods in the period between *time X* and *time X+Y* can be related with sustainability of the given production of A in two ways. First, instead of saving during the period between *time X* and *time X+Y* and spending the money for goods A at *time X+Y*, an individual might spend the money before – for consumption good B. And second, an individual might

borrow money and spend them for consumption good B in the period between *time X* and *time X+Y*. He then repays the loan with the money that would be otherwise spent for consumption good A at *time X+Y*. In both cases, the demands for B are higher than otherwise and so are their prices; in contrast, the demand for goods A is lower than otherwise and so is its price. In addition, the interest rate for the period between *time X* and *time X+Y* is higher than otherwise, which means that the respective discount factor is higher than otherwise. For an entrepreneur at *time X*, the relative profitability of productions of B compared to the production of A is higher than otherwise. The undiscounted revenue from sales of B in absolute terms is higher than otherwise, the undiscounted revenue from sales of A in absolute terms are lower than otherwise. Moreover, the increased interest rate makes one monetary unit of discounted revenues from relatively shorter productions, i.e., those of B, higher than one monetary unit of revenues from relatively longer productions, i.e., that of A. Present values of revenues from B are therefore higher than otherwise and present value of revenues from A is lower than otherwise. Given the costs, the production of the given quantity of A that is to be sold at *time X+Y* might not be sustainable. Revenues lower than otherwise might not be a sufficient incentive for the entrepreneurs to produce the given quantity of the good.

In addition, costs will probably not remain the same and rather reflect the change in the relative profitability. Other productions are now more profitable than otherwise; namely productions shorter than production of A, especially productions leading to B. Entrepreneurs therefore tend to purchase the factors of production in order to expand the shorter production cycle. Consequently the costs of relatively nonspecific factors of production that are used to produce A increase. All in all, there is a tendency for reduction of the amount of produced goods A. If the entrepreneur who makes the decision about the production of A expects this tendency to be sufficiently high, he does not continue in the plan. The amount of consumption good A that is to be supplied at *time X+Y* is then lower than otherwise.

(b) We keep the assumption of the initial plan where the consumption goods A are to be finished

at *time*  $X+Y$ . We then assume that there is a set of other consumption goods C that is to be finished at *time*  $X+Y$ . If a consumer demands less of consumption goods A in exchange for more of C consumption goods, the price of A tends to be lower than otherwise and the price of C tends to be higher than otherwise. If the entrepreneur at *time*  $X$  expects this to happen, the expected present value of revenues from sales of A at *time*  $X+Y$  is lower than otherwise. Moreover, the increased expected present value of the revenues from the good C might lead to increase in costs of the production of A and decrease the profitability of the production of A even more. If the entrepreneur who makes the decision about the production of A expects these tendencies to be sufficiently high, he does not continue in the plan. The amount of consumption good A that is to be supplied at *time*  $X+Y$  is lower than otherwise.

(c) What happens if a person decides to spend less money for the consumption good A at *time*  $X+Y$  and to increase his savings instead? First, the price of A at *time*  $X+Y$  is lower than otherwise. Second, during the period between *time*  $X+Y$  and a later date at which the saving is terminated, the supply of savings is higher than otherwise. During this period, the rate of interest is therefore lower than otherwise. Third, the prices of a set of consumption good D for which the person spends the money saved at *time*  $X+Y$  is higher than otherwise.

What is the result? Since the price of A at *time*  $X+Y$  is lower than otherwise, also the present value of the price of A at *time*  $X$  is lower than otherwise. In contrast, the present value of price of a D good is higher than otherwise. There are two reasons for this: first, the prices of D goods are higher than otherwise; and second, the revenues from the sales of D are discounted by a lower discount rate – a result of the decrease in the interest rate during the period after *time*  $X+Y$ . Entrepreneurs expecting this scenario at *time*  $X$  find longer production processes, especially those leading to the production of consumption good D, more profitable than otherwise. On the other hand, they find the shorter production processes, especially the process leading to the consumption good A, less profitable. If the

entrepreneur who makes the decision about the production of A expects these tendencies to be sufficiently high, he does not continue in the plan. The amount of consumption goods A that are to be supplied at *time*  $X+Y$  is lower than otherwise.

Keeping on mind the three analytically distinct cases of unsustainability of a production, we can now approach the final stage of our treatment – the effect of monetary expansion on the international structure of productions within the framework of independent fiat national currencies.

### **Flexible exchange rates, monetary expansion, and structure of productions**

The question now stands: given the assumptions, what possible consequences can have a monetary expansion in Alfania on the structures of productions in Alfania and Betania through the mechanisms of the foreign exchange market? Before proceeding in our analysis, it is important to clarify what we mean by the structure of productions of Alfania and what we mean by the structure of productions of Betania. Under the international division of labor, the production factors that lead to a consumption good can be located in both countries. However, each service of a resulting consumption good is purchased either by one currency or by another currency. Our distinction is based on this fact. As far as the service of a factor leads to a consumption good that is sold for Alfanian dollars, we regard this particular service to be a part of the Alfanian structure of productions. And by the same token, as far as the service of a factor of production leads to a consumption good that is sold for Betanian pounds, we regard this service to be a part of the Betanian structure of productions.

We argue that the transmission mechanism using the foreign exchange rate has important effects irrespective of expectations held by the entrepreneurs at the moment of the change in the monetary policy. To bear the burden of proof, we therefore have to discuss the options with respect to all three possible relevant expectations beliefs. First, we assume that an entrepreneur correctly expects the time during which the price differential between Alfanian goods and Betanian goods holds. Second, we

assume that the entrepreneur expects the price differential to hold only for a period of time that is shorter than the actual policy. And third, we discuss also the case when the entrepreneur assumes the policy to hold longer than the policy actually does.

Starting with the first case and assuming that the entrepreneur correctly expects the aim and results of the monetary policy, we divide our discussion into two parts. First, we discuss the related consequences for the consumption goods being sold at the time when the new policy is introduced, second we discuss the effects related with the factors of production.

Holders of pounds find Albanian consumption goods cheaper. The demand for these goods is higher than otherwise. The prices of the consumption goods in terms of dollars as a consequence tend to be higher than otherwise. We should note that there is no reason to expect a unilateral change in prices of all consumption goods: the price changes differ between different consumption goods according to the preferences of the holders of the new money balances. Respective Albanian sellers of consumption goods then benefit from revenues higher than otherwise. At this point in time, the production decisions related with the consumption goods are mostly done and it is the price adjustments rather than the quantity adjustments that take place. The sellers of the goods experience profits higher than otherwise, however, these profits, by themselves, do not have any meaning with respect to the production processes that lead to consumption goods in the future. They represent an award of the previous production decisions.

The situation in Betania is somewhat different. Entrepreneur selling substitutes to a consumption good additionally purchased from Albania suffers from the demand lower than otherwise. For the same reasons as in the case above, it is a price adjustment rather than a quantity adjustment that takes place. The entrepreneur therefore more likely suffers loss and bankruptcy than otherwise. On the other hand, there are other entrepreneurs selling consumption goods who have revenues higher than otherwise: pounds that are not spent on the Betanian substitutes of the Albanian goods are now spent on

other goods instead. As the bankruptcies and profits result from the past production decisions ending in the present, they do not have any automatic consequences for the production decisions related with future consumption goods. The bankruptcies or profits mentioned above therefore by themselves do not represent a need for a change in the production structures.

We will now turn our attention to the factors of production. Can we expect a change in the uses of factors of production that results from the arisen price differential between Alfanian and Betanian goods? Value of a production factor is based on the value of consumption goods that are dependent on its presence in the production (Menger 1994, pp. 149 *ff.*). In other words, production factor is relatively more valuable in the case when the consumption goods that are dependent on this factor are relatively more valuable. Production factors therefore tend to be employed in productions where the dependent consumption goods are relatively more valuable. This is important in the situation when the arisen price differential between Alfanian and Betanian goods holds. During this period, the monetary value of consumption goods sold for pounds when compared to the consumption goods sold for dollars is higher than otherwise. Entrepreneurs therefore during this period tend to use more factors in productions leading to consumption goods that are to be sold for pounds rather than for dollars.

Let us say that the Alfanian monetary authority keeps the price differential for a period between *time X* and *time Y*. Entrepreneur making production decisions can compare alternative productions that lead to consumption goods during this period – especially he can compare productions that lead to a sale of a consumption good for pounds with alternative productions that lead to a sale of a consumption good for dollars. In this comparison, the former appears to be relatively more profitable than otherwise. What are the implications for the structures of production of Alfania and Betania?

We will first discuss the case of Alfania. In the discussion, we will use a taxonomy of the production processes that is based on two criterions. First, we will distinguish between Alfanian production processes with respect to their beginning: those that start before *time X* and those that start

between *time X* and *time Y*. And second, in a similar way, we will distinguish between the production processes with respect to projected finalization of these processes: between those that are planned to be finished before *time Y* and those that are planned to be finished after *time Y*.

Let us first turn to the productions that start before *time X* and that are to be finished before *time Y*. After the introduction of the policy, some of them appear to be less profitable than otherwise. Alternative productions that lead to consumption goods to be sold for pounds are on the other hand relatively more profitable. Entrepreneurs therefore bid for the factors of productions in order to employ them in the more profitable productions. As a result, some of the Albanian productions that were supposed to be finished in the period between *time X* and *time Y* are unsustainable and go bankrupt and some of the capital goods that already became too specific (Hayek 2008, pp. 255 *ff.*; Lachmann 1978, p. 2; Soto 2005, pp. 280 *ff.*) are abandoned. It is interesting that it is not possible to classify these unsustainable productions according to the classification given in the previous section on a priori grounds – we do not know whether the alternative productions are shorter, longer, or just different. The only relevant point is that they lead to products in the different monetary area - Betania.

A similar story is related with the productions that are yet to be started in *time X* and that would lead to consumption goods sold for dollars before *time Y*. For the same reasons as in the case of productions started before *time X*, also the productions considered in this case have a lower tendency to be undertaken than otherwise. They are relatively less profitable than otherwise when compared with those that lead to consumption goods sold for pounds. There is, however, an important difference in comparison with the previous case: since the processes are planned to be started only after *time X*, i.e., after the time when the entrepreneurs are already aware of the price differential, there are no resulting bankruptcies and malinvestment, just counterfactual change in the employment of resources. As it is in the previous case, we again cannot report a specific change in the length of the production structures, just a change in the distribution of resources in space.

We will now take a look at the processes leading to consumption goods sold for dollars that are already started in *time X* but that are planned to be finished after *time Y*. One might first think that within our framework, the assumed monetary policy should not systematically affect these productions. After *time Y*, the comparison of a price of a consumption good that is sold for dollars with a consumption good sold for pounds is no longer affected by the price differential resulting from the monetary policy. There is, however, a good reason to agree to the contrary.

Our reasoning in the previous cases has led to the conclusion that in the period between *time X* and *time Y*, holders of dollars are faced with a lower supply of the consumption goods than otherwise. The redistribution process that was already explained leads to a transfer of a part of these goods to the hands of the holders of pounds. In addition this process also leads to changes in the structure of productions in favor of productions leading to consumption goods to be sold for pounds. As holders of dollars face the decline in the consumption goods during the time of the monetary expansion, their relative valuations of consumption during this period has to be higher than otherwise when compared to the consumption after *time Y*. The saving and spending pattern during the period of monetary expansion therefore very likely tends to be different than otherwise. Namely, since the consumption goods between *time X* and *time Y* are suddenly more scarce, holders of dollars tend to substitute their consumption in the period after *time Y* for goods before *time Y* – they tend to save less. The structure of production in Alfania therefore has a tendency to be shorter than otherwise, i.e., we face the case (a) discussed in the previous section. This has a clear set of results for sustainability of the processes that are already under way in *time X* and that are to be finished after *time Y*: there is a tendency for bankruptcies of entrepreneurs that have decided to begin these relatively long productions. In addition, as the production processes are already in some intermediary stage of fulfillment, their cancellation is related with malinvestment of the factors of production.

A similar reasoning can be applied to the productions that entrepreneurs consider to start during

the period between *time X* and *time Y* and that they plan to finish after *time Y*. With introduction of the monetary policy in *time X*, there is a tendency to start less of these processes than otherwise: due to increased scarcity of consumers goods in the period between *time X* and *time Y*, holders of dollars reduce savings that would support processes that are to be finished after *time Y*. In contrast with the case of the processes that have already been started, the processes that are just planned are not related with bankruptcies and malinvestment. Some of them are just not undertaken.

We will now turn the attention to Betania. During the period between *time X* and *time Y*, there are more consumption goods available for pounds than otherwise; and sold at lower prices than otherwise. Holders of pounds therefore tend to change the saving and spending patterns – due to the lower scarcity of the consumer goods between *time X* and *time Y*, they tend to save more in order to buy goods in the period after *time Y*. This leads to two major effects – first, entrepreneurs tend to reduce productions leading to consumer goods sold for pounds in the period between *time X* and *time Y*, i.e., some of these productions become unsustainable as it was discussed for the case (c) of the previous section. The changes in productions are necessarily related with malinvestments, as some of the productions undertaken before *time X* and that are to be finished before *time Y* are abandoned. And second, the higher savings tend to increase the number of productions that lead to consumption goods sold for pounds in the period after *time Y*. The effect in Betania is therefore that of lengthening of the structure of production, i.e., result of the underproduction of consumption goods after *time Y* that would otherwise occur.

Until this point, we have assumed that entrepreneurs held correct expectations with respect to the length of the effect of the monetary policy. We have seen that this led to a shortening of the structure of production of Alfania, to a lengthening of the structure of production of Betania, and to the result that some of the already undertaken investments turned out to be unsustainable with resulting malinvestments. Our question is now whether there is any significant change in the results for the

cases when entrepreneurs hold incorrect expectations about the length of the policy of changes in the money supply.

We will first assume that entrepreneurs are of an opinion that the price spread between the Alfania and Betania goods holds for a longer period of time than it actually does. Let us say that they assume the price spread to end up at *time Z* that comes at some point after *time Y*. Until the mistake is revealed, that is at latest at *time Y*, the effects discussed in the previous set of paragraphs apply. In Alfania, the productions that lead to consumption goods sold for dollars in the period between *time Y* and *time Z* appear less profitable, some of them unsustainable. There is a tendency to shift from productions of these goods to productions of goods that are sold for pounds. As soon as the fallacy in expectations is revealed, it is clear that these productions leading to consumption goods in the period between *time Y* and *time Z* are less profitable than expected, some of them again unsustainable. The producers start to face another series of losses, possible bankruptcies and there are also malinvestments resulting from the productions that have to be stopped but that already became too specific. We can now turn to the case of Betania: here in the beginning – while the incorrect expectations are still held – one can witness the same type of effects as in the case of the correct expectations. With one exception – entrepreneurs expect higher amount of consumption goods in the period between *time X* and *time Z* than they should. This is the same as the expectation that the interest rate is lower than otherwise for a longer period of time. At the point when the error is revealed, the entrepreneurs find that they invested too much into too long production processes. Some of the productions in the Betanian economy turn out to be unsustainable and have to go bust, the related malinvestment is revealed.

We can now discuss the other case, when entrepreneurs expect the price spread to hold for a shorter period of time than it really takes. Let us say that they do not expect it to last between *time X* and *time Y*, but rather only between *time X* and *time S*. In the beginning, the effects are identical as they were explained in the case when the entrepreneurs correctly expected the time during which the value

spread holds, the only difference being related with temporal length of respective effects. The change comes into the picture at the point when the entrepreneurs realize their incorrect expectations. At that point, entrepreneurs have to revise their decisions again. And the process is at this point the very same as in the case when the entrepreneurs make their expectations correctly at time X, including changes in the structures of productions, malinvestment and redistribution.

### **Conclusion: time, space, and markets**

Market is a multidimensional social institution. Proponents of the Austrian theory of the businesses cycle put emphasis on the temporal dimension of the market: it is the relationship between money supply, interest rate, and economic activity that explains the business cycle. We bring about a complementary point of view to the problem. In the special institutional setting, in the case of independent fiat national currencies, it is not only the dimension of time, but also the dimension of space that is important for our understanding of economic fluctuations.

Increase in the domestic money supply manifests itself on different markets at different points in time. Since the foreign exchange market is affected among the first, the change in the money supply leads to a sudden change in the price of foreign goods with respect to domestic goods. In contrast, at other markets, price changes that erode this price differential are only gradual. In the meantime, particular group of market participants – holders of the foreign currency – has an advantage: members of this group can sell their good – foreign currency – at already increased price, and they are at the same time able to purchase goods of the domestic country at the prices that are not yet fully adjusted. In other words, some production processes become for a limited period of time relatively more profitable and other production processes relatively less profitable. This transmission mechanism leads to four key implications:

First, increase in the domestic money supply leads to impoverishment of the domestic country:

it leads to a relative decrease in the amount of consumption goods available for the holders of the domestic currency and it leads to a relative shortening of the domestic structure of production.

Second, the exactly opposite effects can be observed in the case of the foreign country that does not participate on this policy.

Third, the policy of increase in the domestic money supply is related with resulting set of unsustainable productions in both countries.

Fourth, as the monetary policy can be changed relatively quickly and as it depends only on the preferences of the policymakers, it is very likely that many entrepreneurs are incorrect in their anticipations of such a policy. In other words, the effects of incorrect expectations of this policy might play an important role in the effects of the change in the money supply as well. If this happens, the problems of resulting unsustainable productions turn out to be even more significant.

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