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## Debate on reserve constraints and its implications for economic theory

**Abstract.** The present paper deals with the main presuppositions and implications of endogenous money theory. The aim of this research is to prove that reserve money does not represent an effective constraint on bank lending and, therefore, to show that the theory of endogenous money represents a good approximation of the monetary system. We use a framework of basic financial accounting to trace and explain some of the most fundamental monetary operations in the monetary economy. We use this framework to enter into the debate about whether reserves are an effective constraint on bank lending. We argue that reserves are only a soft ex-post constraint on bank lending and not a hard ex-ante constraint. In the last section of the paper we derive some basic implications of endogenous money theory for economic theory in general. The paper is concluded with a proof that money neutrality thesis is not true. That means that monetary phenomena have a direct causal impact on real phenomena.

**Key words:** Heterodox Economics; Theories of Money; Monetary Economics

**JEL Classification:** E51; E42; B50

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**Дебати про резервні обмеження та їхні наслідки для економічної теорії**

**Анотація.** У статті розглянуто основні передумови та наслідки застосування теорії ендогенної грошової маси. Метою даної роботи є довести, що грошові резерви не є ефективним обмеженням для банківського кредитування та показати, що теорія ендогенних грошей являє собою хорошу апроксимацію грошово-кредитної системи. Ми використовуємо основи фінансового обліку для того, щоб простежити та пояснити існування деяких фундаментальних грошових операцій у грошовій економіці. Ведеться дискусія відносно того, чи є грошові резерви ефективним обмеженням для банківського кредитування. Ми стверджуємо, що резерви є тільки м'яким экс-пост обмеженням банківського кредитування, а не жорстким экс-анте обмеженням. В останньому розділі статті представлено основні висновки автора щодо значення теорії ендогенних грошей для економічної теорії як такої. У статті робиться висновок, що гроші не є нейтральними.

**Ключові слова:** альтернативна економіка; теорія грошей; монетарна економіка.

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**Дебаты о резервных ограничениях и их последствия для экономической теории**

**Аннотация.** В статье рассмотрены основные предпосылки и последствия теории эндогенной денежной массы. Целью данной статьи является доказать, что резервные финансы не являются эффективным ограничением банковского кредитования. В статье доказывається, что теория эндогенной денежной массы представляет собой аппроксимацию денежно-кредитной системы. Мы используем структуру основного финансового учета для того, чтобы проследить и объяснить некоторые из наиболее фундаментальных денежных операций в экономике. Ведется дискуссия относительно эффективности использования резервов при банковском кредитовании. Мы утверждаем, что резервы – это только легкое экс-пост ограничение при банковском кредитовании, а не жесткое экс-анте ограничение. В последнем разделе статьи приведены основные выводы автора относительно значения теории эндогенной денежной массы для экономической теории как таковой. Заключение является доказательством того, что нейтралитет денежной массы не действителен.

**Ключевые слова:** альтернативная экономика; теории денег; монетарная экономика.

**Introduction.** The paper deals with the basic presuppositions and implications of the theory of endogenous money. The theory of endogenous money is sometimes considered as a controversial, because it contradicts some fundamental components of neoclassical orthodox economics. However, there is a long tradition of heterodox, mainly post-Keynesian, economists that developed the theory of endogenous money

**Brief Literature Review.** The concepts of endogenous money were opened up by such world-known researchers as Moore (1979, 1983) [1; 2], Minsky (1991) [3], Graziani (1989) [4] and Wray (1991, 2012) [5; 6]. The theory seemed to appear less controversial in central banking practices (see Jakab & Kumhof, 2015) [7], some works on international institutions (see Borio & Disyatat, 2009, 2011) [8; 9] and private institutions (see Sheard, 2013) [10]. Also, it is discussed by the government affiliated officials (see Sigurjonsson, 2015) [11].

**Purpose.** The aim of this paper is to prove that reserve money does not represent an effective constraint on bank lending and, therefore, to show that the theory of endogenous money represents a good approximation of the modern monetary system.

**Results.** Section two of this paper deals with the two opposing theories of money that we want to compare. First, we will describe the theory of exogenous money and then we will describe the theory of endogenous money. Section three describes some of the most fundamental monetary operations in a monetary economy using a simplified form of financial accounting. In section four we enter the debate whether reserves represent a constraint on bank lending activity. We define four different types of constraints – ex-ante, ex-post, hard and soft constraints. We argue that reserves are only a soft ex-post constraint on bank lending. Given that reserves are only a soft ex-post constraint we conclude that we can model the monetary economy as an endogenous money system. In section five we derive several implications of the theory of endogenous money regarding economic theory as such. We show that bank lending does by definition increase the stock of money in the economy and most of the time the flow of money in the economy as well. That means that net bank lending increases aggregate demand and net repayment of loans decreases aggregate demand. We also derive that for an endogenous money economy it is not the case that all savings precede and determine in-

vestments, rather it is the case that some investments precede and determine savings. We also show that given that endogenous money is true, another thesis of orthodox economics cannot be true. We show that money cannot be neutral. That means that monetary phenomena have a direct causal impact on real phenomena. In section six we summarize the contributions of this paper.

**Theories of Money**

In this part of the paper we will present and compare two competing theories of money. However, in this part we will not go into technical detail. The purpose of this part is to provide the most basic and holistic description of the two theories. The first theory we will discuss is the theory of exogenous money and the second theory is the theory of endogenous money.

**1. The Theory of Exogenous Money**

The exogenous theory of money still sees money as a special kind of commodity. The commodity we use today is paper money. We use paper money because it cannot be easily produced by everybody, it is durable, easy to store and easy to manage.

Where does money come from in this view? The process of money creation is, according to this theory, exogenous. The outside force which decides how much money there will be in the economy is the Central Bank. The Central Bank can increase or decrease the stock of money in the economy, but for every other economic agent, there is always a fixed amount of money in the economy, which cannot be changed without a deliberate action by the Central Bank. So at any given time the amount of money every economic agent can possess is limited and cannot be voluntarily increased, without a voluntary decrease in money possessed by another economic agent as can be seen in Eggertsson & Krugman (2012) [12]. This is also true for commercial banks. In this view, commercial banks are seen as mere financial intermediaries. They simply get money deposits and lend those money deposits out to somebody else. That means that the amount of money one agent, the saver, currently has, should go down so that the amount of money another agent, the debtor, will have can go up. No new money is created in the system.

Fundamentally the exogenous money view sees money as a commodity, as a «thing» that can be handed over to somebody else, but also as something that the economy cannot produce for itself – money has to be injected into the economy from the outside, it has to be set «exogenously».

**2. The Theory of Endogenous Money**

The theory of endogenous money sees money as something different than a commodity and something which can be created «inside» the economy. Money is seen as a promise to pay, as an IOU. This is explained in Mcleay & Radia & Thomas (2014A) [13]. Money is not a commodity, it is a promise, which can be written down and, therefore, it can have a physical form. To be precise: money is a record of a promise made by *someone* to *somebody* else to give *something*, in the future. We could substitute these variables and get different kinds of money that are used in a modern economy.

Currency is a record of a promise by the central bank made to all economic agents that they can trade their records for appropriate number of goods and services. Deposits are thought to be a record of a promise made by commercial banks to depositors that they can trade their records for currency. Reserves are considered to be a record of a promise made by central banks to commercial banks that they can trade their records for currency. We can now see how money could be viewed as an IOU. The IOUs can be redeemed or simply traded, as is the case with deposits.

Then, how is money created according to this view? It is created «inside» the economy. That is, it is created endogenously. In our modern economies the function of money creation is delegated to the banking system as was proved by Werner (2014) [14]. Money is created within the system as some designated economic agents see fit. The stock of money is changing every second based on the institutional rules of the banking system. Every loan extended creates new money deposits, hence, the stock of money expands; and every loan re-

payment destroys money deposits, hence, the stock of money contracts.

According to this theory then, money is never fixed or set exogenously. The stock of money is elastic to the desires of the economic system. Therefore, a monetary economy cannot be money constrained in the hard sense. Money is not something an economy can run out of, because it is not a commodity – it is a promise. And it is impossible to run out of promises, although they can be broken.

Now we will discuss the institutional realities of the banking system to show that the endogenous money view approximates the monetary economy we live in better than the exogenous money view.

**The Basic accounting of monetary operations**

In this part of the paper we will discuss some of the most basic monetary processes in a monetary economy. We will use some basic accounting as we believe that it makes the conceptual grasping of the theory of endogenous money easier. This approach is also used in Mcleay & Radia & Thomas (2014B) [15].

In Figure 1, we can see a highly simplified and stylized balance sheet of a commercial bank.

Commercial bank	
Assets	Liabilities
Loans	Deposits
Reserves	
Currency	

Fig. 1: A Balance sheet of a commercial bank  
Source: Author's construction

A bank has *assets* that which the bank owns and *liabilities* that which the bank owes. For the purpose of this paper let us assume that the bank does not have any physical assets, but owns only financial assets. What are the items on the balance sheet of the commercial bank? *Loans* are records denominated in the unit of account which represent a promise made by a debtor to the bank, that he/she will repay his/her loan (using his/her money deposits). Loans are an asset of the commercial bank and a liability of the debtor. *Deposits* are records denominated in the unit of account which represent a promise by the bank to the depositor that the deposits can be transformed into currency, or that they can be used to pay for goods and services. *Reserves* are records denominated in the unit of account which represent a promise by the central bank to the commercial banks that they can transform their reserves into currency on demand or that they can be used in the inter-bank payment system to clear accounts between banks. By *currency* we simply mean legal notes and coins. Now we will look at different relationships between these balance sheet items.

First we will describe how currency money gets deposited on an account at a bank and how money is taken from the account usually using an ATM.

In Figure 2, we see the process of depositing money.

Commercial Bank		Non-bank Agent	
+ Currency	+ Deposits	- Currency	
		+ Deposits	

Fig. 2: The process of opening a bank account  
Source: Author's construction

The non-bank agent (NBA) wants to deposit his/her currency money. That means that he/she will go to a bank and give his currency to the bank – the currency asset of the NBA decreases and the currency asset of the bank increases. The NBA will get something in return. His/her deposit balance, an asset of his/her, will rise. This means that the bank will increase its deposit liability. The bank promises that the NBA can withdraw currency money from his/her deposit at any time and that he/she can make payments using the deposit account. The process of currency withdrawal is the exact opposite of the process shown in Figure 2.

In modern economies, it is typical that payments in the economy are made using bank deposits directly without the need to use currency, so the process of payment using only deposits is perhaps more important.

In Figure 3, we can see the process of payment using deposits.

Commercial Bank		Non-bank Agent C		Non-bank Agent D	
Loans	Deposit C	Deposit C		Deposit D	
Reserves	Deposit D	- Deposit C		+ Deposit D	
Currency	- Deposit C				
	+ Deposit D				

Fig. 3: The process of a deposit transfer  
Source: Author's construction

There was no need for any currency or reserves in this operations. The bank just changed the records in the appropriate accounts. Now we will look into another important function of the monetary system – that of loan creation.

In Figure 4, we can see how a loan extension works.

Commercial Bank		Non-bank Agent	
+ Loan	+ Deposit	+ Deposit	+ Loan

Fig. 4: The process of lending money deposits  
Source: Author's construction

Let us say that an NBA wants a loan. He/she will go to a bank and if the bank decides that he/she is credit worthy, the loan will be extended. That means that the bank will have a new financial asset – the loan, but also a new liability – the corresponding deposit. Nowhere was any sum of money deducted. Nowhere was any account debited. Thus, no money was transferred – in every sense of the term «money». The bank simply opened an account for the NBA and credited the deposit account with the appropriate sum of deposit money. The NBA now has a new asset – the deposit, but also a new liability – the loan. Note that no currency or reserves were needed for the loan extension to take place. The bank simply created new money, new deposits *ex nihilo*.

We will further complicate matters a bit, because we want to explain the purpose of reserves in the system. If they are not used in the process of loan extension, what use do they have? The two principal uses that they have are that reserves can be used to acquire currency and that they can be used in the interbank payment mechanism.

A central bank is the only agent in the economy that can create or destroy reserves and currency, the same way that commercial banks are the sole creators and destroyers of deposits. If a commercial bank feels that it needs more currency, it will simply order the central bank, which is obligated to transform the desired amount of reserves into currency and send it to the commercial bank. Reserves are however much more widely used for clearance in the interbank payment mechanism, which is their primary function.

In Figure 5, we can see the process of the interbank payment mechanism.

It is true that the process of paying for something does not change the stock of any money in the economy. The holdings of reserves and deposits simply changed owners.

Central bank			
		Reserves A	
		Reserves B	
		- Reserves A	
		+ Reserves B	
Non-bank Agent C		Non-bank Agent D	
Commercial bank A		Commercial bank B	
Reserves A	Deposit C	Reserves B	Deposit D
- Reserves A	- Deposit C	+ Reserves B	+ Deposit D
Deposit C		Deposit D	
- Deposit C		+ Deposit D	

Fig. 5: The process of the interbank payment mechanism  
Source: Author's construction

Nevertheless, it is also true that loan extensions do increase the stock of money in the economy. The balance sheets of both the bank and the NBA simply grow accordingly. That means that the more IOUs we have, more money in the economy is. But reserves are needed for the interbank payment mechanism to work. So is the stock of money elastic as in the

endogenous money view or rigidly fixed as in the exogenous money view? The truth lies probably somewhere in between. The question we want to ask for the purpose of economic theory is: which view approximates the reality better? Is the stock of deposit money more akin to an elastic stock of money or to a fixed stock of money? To answer this question we have to answer the question whether reserves represent a constraint on bank lending.

How strongly are commercial banks constrained by reserves in their lending activity? If we find that they are strongly constrained, then the exogenous money view will approximate reality better; if we find that they are less strongly constrained, then the endogenous money view will approximate reality better.

**The debate on reserve constraints**

Some economists argue that reserves are a constraint on the lending activity of commercial banks (see Tobin, 1963) [16]. We will explore this view. But first we need to define what we mean by a *constraint*. We will define 4 different types of constraints. We will talk about ex-ante constraints, ex-post constraints, hard constraints and soft constraints.

- An ex-ante constraint is a constraint that states that some condition A has to be necessarily fulfilled for the possibility of event B to occur. If condition A is fulfilled, event B can occur; and if condition A is not fulfilled, event B cannot necessarily occur.
- An ex-post constraint is a constraint which states that if event B occurs, event A should occur at some later date.
- A hard constraint is a constraint which posits an obstacle which cannot be overcome.
- A soft constraint is a constraint which posits an obstacle, but one which can be overcome with relative ease.

It is clear that every ex-ante constraint is a hard constraint by definition. If event A is a necessarily precondition for event B to occur, then event A is a hard constraint towards achieving event B. An ex-post constraint can, on the other hand, be a hard constraint and also a soft constraint. We have therefore three possibilities to examine. Are reserves a hard ex-ante constraint, a hard ex-post constraint or a soft ex-post constraint?

Economists who argue that reserves are a hard ex-ante constraint think that commercial banks need reserves before they can make a loan extension, because banks lend out reserves. In this view reserves would be an ex-ante constraint, because banks would need to get reserves *before* they make a loan. Reserves would also constitute a hard-constraint, because reserves are *that which* is lent out during a loan extension. However, this view is fundamentally mistaken. Reserves cannot be lent out to NBAs simply because reserves are assets of commercial banks and liabilities of the central bank. They cannot leave the interbank reserve money system and they cannot be transformed into loans or into deposits. That is why they are called «outside money». So, reserves are not a hard ex-ante constraint, because reserves are not needed *before* the loan extension process but only *after* it. This is proven by the simple institutional fact that reserves cannot leave the accounting books of the central bank – they cannot be credited into a deposit account.

Other economists argue that reserves are a hard ex-post constraint. They acknowledge that reserves are not lent out. But they argue that reserves are still needed because reserves will be needed after the loan is made, once the debtor wishes to transform his/her loan deposit into currency or once the debtor wishes to pay for something to another NBA who has a deposit account at another bank. Reserves are also needed in some countries for commercial banks to fulfill minimal reserve requirements. These three objections are certainly true. There

have to be sufficient reserves in the system, so that all those three possibilities are accounted for.

The error that the proponent of the view that reserves are a hard ex-post constraint makes us assume that the commercial banks will simply passively wait for the arrival of the reserves needed or wanted. The proponents of this view also mistakenly assume that the central bank would not intervene in a banking system that is reserve starved.

Now we will start to argue that reserves are indeed an ex-post constraint, but also that they are a soft constraint rather than a hard constraint and that it is, therefore, feasible to model the monetary economy as a reserve non-constrained system – a system of endogenous money. We believe that this will approximate the truth of the matter to a greater degree than an exogenous money view.

It is not the case that commercial banks have to passively wait for new reserves to arrive if they feel the need for more reserves.

In Figure 6, we can see the market for interbank liquidity.

Central bank		Commercial bank A		Commercial bank B	
	Reserves A	Reserves A	+ Loan	Reserves B	
	Reserves B	+ Reserves A		- Reserves B	
	+ Reserves A			+ Loan	
	- Reserves B				

Fig. 6: The process of lending reserves  
Source: Author's construction

It could be argued that this operation represents simply an exchange of reserves. But what if the banking system as a whole is reserve starved? What if it is the case that there is a greater demand for reserves than there is supply? To counter this dilemma modern monetary systems have a central bank.

In Figure 7, we can see the fundamental process of any monetary policy operation.

Central bank		Commercial bank A	
Loans	Reserves A	Loans	
+ Loans (collateral)	+Reserves A	Reserves A	
		- Loans (collateral)	
		+Reserves A	

Fig. 7: The process of monetary policy implementation  
Source: Author's construction

Let us say that the banking system consisting of bank A is reserve starved. The central bank can engage in open market operations and buy some financial asset from bank A (and use it as a collateral). That means that bank A swaps its assets. It will give a financial asset (a loan for example) as collateral and receive the reserves it needs. The central bank will have a new asset and also a new liability. Open market operations are made if the central bank wants to, but there are instruments for commercial banks to get the needed reserves even if other commercial banks or the central bank does not want to actively lend them. These instruments are accounting- and theory-wise the same operations as shown in Figure 7. The only difference is that these instruments can be used at the discretion of commercial banks.

Still, some could argue that the central bank could, if it wished to do so, withhold the needed reserves. In theory this is possible, but in practice, if the central bank would be willing to withhold the needed reserves, it would break its own institutional rules of *steering the interest rate* on reserves and of *safeguarding financial stability*.

Firstly, we will analyse the interest rate policy. There is an interbank market for liquidity, which is pretty much the market for reserves. The reserves traded have an interest rate. Let us call it the actual interest rate IRA. The central bank want to steer the IRA. It does it by announcing an interest rate policy target, let us call it IRT and by buying or selling for reserves on the market if the IRA is too high ( $IRA > IRT$ ) or too low ( $IRA < IRT$ ). Let us suppose that the banking system is reserve starved. The

demand for reserves will go up. That means the IRA will start to rise and the central bank will have to buy on the market or it will not be able to hit its own interest rate target. Thus, central banks have to provide the needed reserves or they will not be able to hit their interest rate targets.

Secondly, given that the central bank does not have an IRT, what would happen if it did not provide the needed reserves to a reserve starved banking system? It would severely threaten the stability of the financial system, which is in violation of its mandate. In Figure 5, we have explained how the interbank clearing mechanism works. This mechanism is needed for the transfer of deposit money between accounts of different banks to occur. If banks would not have enough reserves to clear their accounts, deposit money could not flow and if deposit money could not flow, not only would the financial system cease to function, but the real economy would collapse as well. No sane central bank would want to be responsible for such a policy outcome. Thus, given the institutional rules and instruments in place, the commercial banks will get the needed reserves – the central bank will provide them.

**Theoretical implications of the theory of endogenous money**

We have described how the monetary system works. The central bank does play an important role, but the effects of monetary policy are much more subtle and more «after the fact» than is supposed by orthodox economists. The central bank has to increase the monetary base accordingly if it wants to fulfill its mandate, given a banking system that endogenously expanded the stock of deposit money. We do not say that commercial banks are completely free in their money creation. There are many factors in play for a commercial bank to be successful. But we do say that reserves are not a constraint on money deposit creation, because there are many relatively easy ways for a commercial bank to get the needed reserves after it makes a loan. To be precise, it is most correct to say that reserves are a soft ex-post constraint. This appears to be a fact.

Being theoretical economists, we have to ask ourselves the question how this fact might change our modeling practices of economic systems. We feel that, if we wanted to model a banking system, we would certainly need to incorporate all the details about currency, reserves and deposits in the model because that is what a banking model would want to explain. But we also feel that, if we want to model the macro economy, it is forgivable to model the macro economy as a system without reserves and currency because those monies will get into the system if the system needs them too. So we think that we should model the macro economy on the assumption that there is only one type of money in the economy – deposit money and that this money stock is completely elastic to the desires of the banking sector and of the potential debtors in the real economy. That means that the money stock should be viewed as endogenous – in simple macroeconomic models that do not wish to fully explain the functioning of the banking system. Therefore, given that the money stock is endogenous, what are the most immediate implications for economic theory?

There is a direct relationship between the flow of bank loans and the flow of aggregate demand. Debt or credit directly influences the aggregate demand. If the flow of new loan extensions is greater than the flow of loan repayments, then the flow of the aggregate demand is enlarged by the net flow of loans and is greater than it would have been given only the flow of aggregate demand financed by already existing money. If, on the other hand, the flow of new loan extensions is lower than the flow of loan repayments, then the flow of aggregate demand is reduced by the net flow of loans and is lower than it would have been given only the flow of aggregate demand financed by existing money.¶

This would mean that money is never neutral towards the real economy. Both the flow of new money coming in and the

flow of money going out are influencing not only the structure of aggregate demand but the level as well. And the aggregate demand of course influences real economic activity. The advantage of this insight is that from this model it is obvious why periods of credit booms lead to booms in the real economy and credit crunches lead to busts as is explained by Keen (2011) [17] and seen in Biggs & Mayer & Pick (2009) [18].

From endogenous money there also follow implications which is highly non-intuitive for households, businesses and orthodox economists. In an endogenous money system we do not have to save before we can invest (see Lindner (2012) [19]). That does not mean that it is not a good economic idea to save or that it is always a good economic idea to invest using loans. This does, however, mean that savings are not a hard ex-ante constraint on investment in an endogenous money economy. Such an economy savings are sometimes an ex-post result of some investment.

Let us describe the process with financial accounts. There are essentially two ways how an NBA can invest. He/she can either use retained earnings of past economic activity or he/she can get a loan. If he/she invests out of retained earnings, then it is really the case that savings are used for investment purposes – saving precedes and determines investment. But an NBA can also invest out of a loan.

In Figure 8, we can see the process of investing out of a loan

Commercial bank		Non-bank Agent C		Non-bank Agent D	
+ Loan C	+ Deposit C	+ Deposit C	+ Loan C	Deposit D	
	Deposit D	- Deposit C		+ Deposit d	
	- Deposit C				
	+ Deposit d				

Fig. 8: The process of investing out of a loan  
Source: Author's construction

The stock of money in the economy after this process increased by «+ Deposit d». The investment desire preceded the

savings used to pay for the investment good. Investment preceded, created and determined saving. Hence, it is not true to say that for an endogenous money economy savings always precede investments and that the economy has to save before it can invest. An overgeneralisation of the simple fact that households and businesses cannot create their own money is simply a myth.

Thus, given money is endogenous, it is true that new lending can increase aggregate demand and that new money can finance new investments. Both processes obviously impact the real economy, which is why money is never neutral.

If endogenous money is true, a lending bank directly influences aggregate demand; loan-financed investments create savings and money is non-neutral.

**Conclusions**

In this paper we presented some basic theoretical approaches towards money – the exogenous and endogenous money views. We used a basic form of financial accounting to describe some fundamental monetary operations of the monetary economy. Using this method and some institutional rules of the monetary system we proved that reserves are neither a hard ex-ante constraint nor a hard ex-post constraint, but rather that they are a soft ex-ante constraint on bank lending. Given this, we feel that the endogenous money view approximates the truth of the monetary economy to a greater degree than the exogenous money view. That means that we should build macroeconomic models that are consistent with the theory of endogenous money. For this to be the case, we have to acknowledge that the flows of banking loans directly influence the flow of aggregate demand and that in an endogenous money economy bank loan financed investments precede, create and determine savings, which means that monetary phenomena influence the level and

the structure of economic activity. Therefore, we conclude that, given an endogenous money stock, money is not neutral.

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Received 25.10.2015

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