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Diversion Of Money into Unproductive Activities in Iran's Economy

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Abstract

This paper examines how the use of money in Iran's financial systems has diverted from productive to unproductive activities. Over the last three decades, with the exception of a few years, the liquidity growth rate in the Iranian economy has been greater than the sum of inflation rate and real GDP growth. This difference, according to the quantity theory of money, can be interpreted as a reduction in the income velocity of money. However, considering that the inflation and interest rates have been continuously high (in some cases above %20), it may not be reasonable to accept that the circulation of money has been getting slower than before. One explanation of this paradox is that, during the aforementioned period, the circulation of money did not decline, but "instead the ratio of irrelevant -to -GDP transactions to total transactions (relevant and irrelevant) has gone up". The increase in this ratio would be largely attributed to a disproportional expansion of unproductive activities in operating within Iran's economy. Our hypothesis is that the significant increase in the liquidity growth rate, has been a drag on economic productivity and growth, instead of facilitating and enhancing economic growth. To test this hypothesis, we considered the difference between the liquidity growth rate and the sum of inflation rate and real GDP growth as a proxy of the unproductive activities and then estimated its impact on the GDP. The results indicate that increases in unproductive activities have had a significant negative impact on the GDP. This finding supports our hypothesis that the high growth rate of liquidity in Iran's economy has been in favor of the unproductive activities and thus, a drag on the economic growth.

Keywords: Unproductive Activities, Transaction Velocity of Money, Iran Economy

چکیده

این مقاله به واکاوی انحراف منابع پولی در نظام مالی ایران از فعالیت‌های مولد به‌سوی فعالیت‌های غیرمولد طی دوره ۱۹۹۸ تا ۲۰۲۴ می‌پردازد. طی سه دهه اخیر، نرخ رشد نقدینگی در اقتصاد ایران پیوسته از مجموع نرخ تورم و رشد تولید ناخالص داخلی حقیقی فراتر رفته است؛ شکافی که در چارچوب نظریه مقداری پول، به‌منزله کاهش سرعت گردش درآمدی پول تعبیر می‌شود. با این حال، با توجه به استمرار نرخ‌های تورم و سود بانکی بالا، پذیرش فرضیه کندتر شدن چرخش پول با منطق اقتصادی ناسازگار است. تبیین این پارادوکس نشان می‌دهد که سرعت گردش پول کاهش نیافته، بلکه نسبت مبادلات نامرتبط با تولید ناخالص داخلی به کل تراکنش‌ها افزایش یافته است؛ رخدادی که ریشه در انبساط نامتوازن بخش‌های سفته‌بازانه و نامولد دارد. فرضیه پژوهش این است که رشد شتابان نقدینگی، به‌جای تسهیل رشد اقتصادی، به مانعی در مسیر بهره‌وری بدل شده است. برای آزمون این فرضیه، مازاد رشد نقدینگی نسبت به مجموع تورم و رشد تولید ناخالص داخلی حقیقی به‌عنوان متغیر جانشین (پراکسی) فعالیت‌های غیرمولد در نظر گرفته شد. نتایج تجربی بیانگر اثر منفی معنادار گسترش فعالیت‌های غیرمولد بر رشد اقتصادی است. این یافته تایید می‌کند که هدایت نامناسب نقدینگی، با تغذیه بخش‌های غیرمولد، همچون ترمزی در برابر توسعه صنعتی و رشد اقتصاد ملی عمل کرده است.

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1. Introduction

In this section, at first, the literature pertaining to the unproductive activities and their characteristics is reviewed along with the author's point of view about such activities. Based on some experts' points of view, we, then, explain why the resources and talents tend to support the unproductive sector.

1-1. What are unproductive activities?

Bhagwati (1982) has called phenomena such as lobbying for protection, competing for a share of industrial or import licenses, inducing legislatures to enact monopolistic barriers to domestic entry, utilizing resources to evade "price" or "command" governmental regulations as directly unproductive profit-seeking activities. From his point of view, the essential characteristic of these activities is that these activities do earn income and make profit but don't produce goods and services that enter the utility function directly (by increased production) or indirectly via increased availability to the economy of goods that increase the utility of the individuals. Additionally, since these unproductive activities use real resources, their effect is to contract the available set of consumption possibilities of the economy as a whole. Baumol (1990) was more concerned about the form of allocation of entrepreneurial talent among the productive and unproductive activities than about the impact of unproductive activities on supply quantity. Baumol (1990) emphasized that at any time and place, this is the form of allocation of entrepreneurial talents across the productive and unproductive activities that mainly determines the magnitude of the benefit that the economy derives from its entrepreneurial talents as some exercises of entrepreneurship could sometimes be unproductive or even destructive. Baumol also pointed out that the allocation of entrepreneurship between the productive and unproductive activities can have a profound effect on the innovativeness of the economy and the degree of dissemination of its technological discoveries. Christopher et al. (2010) highlights the fact that unproductive activities are the cause of underdevelopment, poverty and low growth. The authors stated that in an institutional context, underdevelopment is not due to a lack of inputs, but rather to a lack of incentive for productive activities. They also believe poverty traps are due to an institutional environment that discourages productive activities while typically rewarding non-productive actives, not to a lack of inputs. Naude (2008) also has a similar opinion that all entrepreneurs won't be engaged in the activities that have positive consequences for the economic growth (productive activities). While all entrepreneurs are motivated to seek opportunities for self-advancement, in some cases the private benefits of their actions will be outweighed by the social costs. He also believes that perverse allocation of entrepreneurial ability to rent-seeking, evasion, and predatory activities along with low quality entrepreneurial ability can contribute to the economic stagnation and even a 'development trap'. Henrekson (2007), emphasizing on the quality of entrepreneurial activities, has questioned a premise underlying many studies (usually implicitly) that more

entrepreneurship is always better. Henrekson (2007), suggests that this is not necessarily true, because there is no guarantee that a potential entrepreneur will actually put his or her time and effort into the productive activities. He has also pointed out that "If the institutional setting encourages behavior that is wasteful or destructive from the point of view of society, more entrepreneurship means less prosperity." Henrekson's also claimed Baumol's idea is also applicable for rich and developing countries as there are many instances of unproductive or predatory entrepreneurship in rich countries as well, although wealthy word does generally a good job of using the entrepreneurial talents for inherently productive purposes and this is what actually explains a large part of their wealth.[1]

"In this paper, we define unproductive activities as activities that fail to create any real economic value, earn very high incomes, are a drag on the productivity and growth through the absorption of limited resources as well as the increased rate of returns and the discount rates which consequently raise the opportunity costs for productive investments". Examples of unproductive activities are corruption, rent seeking, smuggling, illegal and even unnecessary legal activities that receive a remarkable fraction of total national income and actually restrict the productive activities to a small proportion of total income. Based on these criteria, if some conventional productive activities deviate from their functions, they could be considered as unproductive activities. If the financial activities, for instance, are a drag on the growth instead of facilitating, these would be placed into the unproductive category, though their original function was to facilitate the productive affaires and play a vital role in production process. In brief, some of the following characteristics can be used to define unproductive activities:

1. Failing to create any real economic value, directly or indirectly.
2. Receiving a relatively high income at the expense of about equivalent reduction in income of productive agents. Thus, they change the distribution of income against the productive agents and their expansion moves the economy from being a positive-sum-game to a zero-sum-game.
3. Increasing the opportunity costs for the productive investments through their own high returns and increasing the discount rates for the evaluation of investment projects.
4. Eliminating them from the economy not only doesn't harm the long run economic growth and development but also facilitates it.
5. limit or hamper the competitive production of goods and services directly or indirectly.

1. Adam Smith (1776) divided the labor force into productive and unproductive: "There is one sort of labor that adds to the value of the subject upon which it is bestowed; there is another which has no such effect. The former as it produces value, maybe called productive, the latter unproductive labor." But this idea is somewhat different from those we quoted above.

1-2. Why do resources and talents tend to move toward the nonproductive activities?

The economy as a whole can be considered a one social game and, thus, its rule and payoffs matrixes determine how resources and talents are allocated across activities. Christopher et al. (2010) believes that while inputs and resources are clearly necessary for economic growth, these things alone can't contribute effectively to economic growth - unless formal and informal institutional structures are conducive to productive activities. If those institutions attach a relatively high payoff to non-productive activities, the outcome will be persistent stagnation and underdevelopment regardless of the level of inputs. Therefore, Christopher et al. (2010) points out:

> *"where inputs are not being transformed into outputs, it is because the payoff associated with the process of transformation is not sufficient to induce productive entrepreneurs to undertake production.".*

Baumol (1990) introduced the relative reward as the main determinant of unproductive activities growth:

> *"at least one of the prime determinants of entrepreneurial behavior at any particular time and place is the prevailing rules of the game that govern the payoff of one entrepreneurial activity relative to another." – again format full quote as a separate paragraph, slightly indented.*

This means that if the rules and payoffs impede earning of an income through activity A, but facilitate earning of an income via activity B, other things being equal, entrepreneurial talents will tend to move toward activity B. If activity B contributes less to growth or welfare than activity A, the consequence of the imposed rules and payoffs will be a drag on economic growth. Baumol (1990) concludes that the rules of the game and payoffs matrix to different entrepreneurial activities play a key role in allocating entrepreneurship across productive or unproductive directions and that this can significantly affect the economy's productivity growth. Hobsbawn (1969) has also supports this idea: "It is often assumed that an economy of private enterprise has an automatic bias towards innovation, but this is not so. It has a bias only towards profit." Henrekson (2006) has quoted North on the role of incentive structure in economic growth and has confirmed that: Douglass North (e.g., 1990) criticized the traditional view that economic growth is achieved by the accumulation of factors of production, while he believes these are just proximate causes of growth but the ultimate causes for development are instead the incentive structure that encouraged individual effort and investment in physical and human capital and in new technology. From Baumol's point of view, incentive structure is in turn determined by "the rules of the game in society" or the institutional setup broadly construed.

Based on the provided discussions, we conclude that the relative returns determine how resources and talents are allocated across activities.

2. The quantity theory of money and some of its experimental hidden angles

Here, the goal is not to contribute to controversial debates on monetary theory but instead we discuss some empirical aspects of the quantity theory of money to explain some strange and paradoxical facts in Iran's economy.

2-1. Some seemingly paradoxical facts

Based on the formula for the quantity theory of money, the historical data shows that in some cases, the income velocity of liquidity has been declining while actually it has been constant:

2-1-1. Diversion of money toward unproductive activities

In recent years, it has been observed that the liquidity growth has been greater than the nominal GDP growth in Iran's economy. According to the quantity theory of money, this implies that there must be a decrease in the income velocity of liquidity. However, according to a basic macroeconomic theory, money doesn't get cold or hot unless inflation expectations, interest rates and the degree of uncertainty all experience sharp (or at least considerable) fluctuations. In other words, money gets cold only when the interest rate and inflation expectations are decreasing[1]. Considering that Iran's economy has continuously experienced a double-digit inflation rate and very high interest rates over recent decades, it would not be reasonable to accept that the circulation of money has gotten slower than before (see Table1).

Table 1 – Inflation and interest rates (percentage)[2]

Year	2001	2002	2003	2004	2005	2006	2007
Inflation rate	11.27	14.33	16.47	14.76	13.43	10.02	17.34
Interest rate	18	18	18	17	18	16	14
Year	2008	2009	2010	2011	2012	2013	2014
Inflation rate	25.41	13.55	10.09	26.29	27.26	36.60	16.61
Interest rate	14	14	16	18	18	24	30
Year	2015	2016	2017	2018	2019	2020	2021
Inflation rate	12.48	7.25	8.04	18.01	39.91	30.59	43.39
Interest rate	28	24	24	25	25	22	22

Source: Inflation rate data from database: World Development Indicators, Last Updated: 12/22/2022

1. See Milton Friedman "The Quantity Theory of Money: a Restatement," in Studies in Quantity Theory of Money, University of Chicago Press 1956.
2. Actual interest rates have been greater than the numbers that are shown in the table.

This situation might be viewed as a paradox or it could mistakenly be concluded, that the quantity theory of money doesn't work for Iran's economy. The quantity equation of money can be broken down though into two different aspects: an accounting aspect (as an identity) and a theoretical aspect. As an identity, the quantity equation of money anywhere and anytime is hold but, in some cases, it needs to be modified or interpreted based on its theoretical aspect. In the evolution path of quantity theory, when we move from the money equation of total transactions (P.T=M.V) to relevant -to- GDP transaction (P.y=M.V), the implicit assumption is that the ratio of relevant -to -GDP transactions , (P.y), to total transactions, (P.T), is constant . If this ratio is constant, income velocity of money (which serves as a residual in the latter equation) would reflect the actual changes in circulation of money. However, if this ratio isn't constant, V in the equation can change without reflecting any actual change in circulation of money. For example, assume the available stock of money in time t1 is 1000 units and the value of total transactions and relevant -to- GDP transaction is 4000 and 2000 units respectively. Thus, the transaction velocity and income velocity of money in time t1 are 4 and 2 respectively. Then assume in time t2 the stock of money is 1100 units and the values of total transactions and relevant-to-GDP transactions are 4400 and 2100 units respectively. According to the quantity equation of money, the transaction velocity and the income velocity of money in time t2 are 4 and about 1.9 respectively. This equation shows that from t1 to t2 the income velocity of money has declined, but actually it hasn't; because 50 units of increased money (of 100 units) have covered 100 units of relevant -to-GDP transactions and 100 units of irrelevant -to-GDP transactions and the other 50 units have covered exclusively 200 units of irrelevant- to -GDP transactions. In other words, the total 100 units of new money have covered 400 units of total transactions and only 50 units of it have covered 100 units of relevant- to-GDP transactions. This example illustrates that although the ratio of relevant-to-GDP transactions to total transactions has declined from1/2 to 21/44 and also the quantity equation of money implies a reduction in the income velocity, both the income and transaction velocities have remained constant (2 and 4 respectively).

2-1-2. Structural changes

Structural changes could also reflect a reduction in the income velocity of money (based on the quantity theory) despite the actual velocity is constant. For instance, in 1960s, the income velocity, calculated using the quantity equation (see Table 2), was very high. In this case, this was not a sign of hot money, but was mostly due to the prevalence of barter transactions.

Table 2- Income velocity of liquidity in Iran's economy in 1960s

1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
5.78	5	4.36	4.2	4.18	3.94	3.66	3.42	3.27	3.18	3.17	3.03	3.31	3.66	2.9	2.7

Source: Author's calculations using data from the central bank of Iran

Since the late 1960's the Iranian business environment has improved and the economy has become more modernized, resulting in the ratio of barter transactions to total transactions to decreased to almost zero. Hence, according to the quantity equation, income velocity of money as a residual item has declined while in the real world it has actually been constant because the inflation expectations and interest rates haven't been less than before (see Table 3).

Table 3- Changes in Inflation and interest rates in Iran from 1962 to 1977

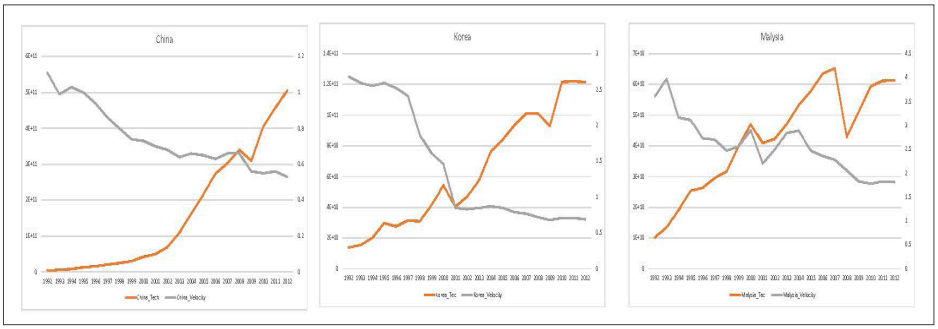
Year	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
Inflation rate (%)	1	1	4	0	1	0	2	4	1	6	6	22	16	10	17	25
Interest rate (%)	6	6	4	4	5	5	7	8	8	-	-	8-11	8-11	8-11	9-11	9-12

Source: Central bank of Iran

Although analyzing this structural change from the barter to money transactions is not the focus of this study, presenting a numerical example is helpful to illuminate the story. Assume that in time t1 the total nominal GDP is 1000 units where 500 units of which are traded by money and the other 500 units are barter transactions and also assume that in time t1 the stock of money is 250 units. According to the equation of quantity theory, the income velocity of money is 4 (1000/250=4) while the actual circulation of money should not be more than 2 (500/250=2) because only 500 units of relevant-to-GDP transactions are covered by money. Now assume that in time t2, the economy becomes more modern and all the transactions are covered by money and thus the total of 1000 units GDP are traded by money. Moreover, assume the stock of money increases to 500 units to cover the new monetized transactions. This implies that the income velocity of money has remained constant (1000/500=500/250=2).

2-1-3. Technical progress

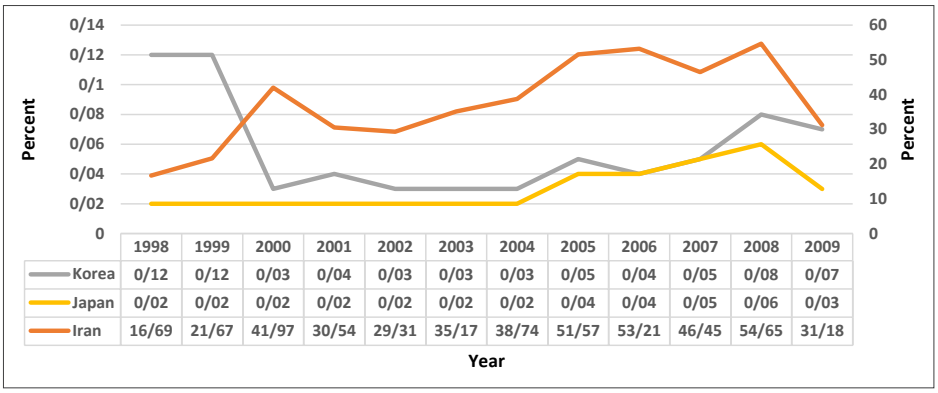
Technological progress is another situation where the equation of quantity theory may suggest a declining income velocity while the actual circulation of money is more and less constant. As economies move from producing primary and natural-resource based goods to more high-tech goods, for a given amount of nominal GDP, the number and nominal value of intermediary goods (and the number of associated transactions) increase. This results in a hike in the amount of money that is needed for covering all transactions (of final or intermediary goods and services). For some of the countries in East Asia, for instance, there are some stylized facts that reveal a high negative correlation between the growth of high-tech's production and the income velocity of money (as a residual item in the equation of quantity theory). Therefore, as the process of industrial production in these economies becomes deeper, more money is needed to cover the increased intermediary transactions, however the formula shows a decrease in the income velocity of money (see Figure 1).



Source: comtrade.un.org/data

Figure 1 (a, b, c)- High-tech exports and income velocity (these graphs need to be much larger, and have clearly labeled axis and improved titles)

In these countries, the ratio of irrelevant-to-GDP transactions to total transactions has also increased which corresponds to an increased transaction of intermediary goods and switching from natural-resource based goods to high-tech goods with high added-value - not to an increase in unproductive activities. This situation does not apply to the economy in Iran because in the recent decades, the production of high-tech goods hasn't experienced a considerable growth. The economy as a whole has not been diversified and has remained predominately natural-resource based (see Figure 2).



	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Korea	0/12	0/12	0/03	0/04	0/03	0/03	0/03	0/05	0/04	0/05	0/08	0/07
Japan	0/02	0/02	0/02	0/02	0/02	0/02	0/02	0/04	0/04	0/05	0/06	0/03
Iran	16/69	21/67	41/97	30/54	29/31	35/17	38/74	51/57	53/21	46/45	54/65	31/18

Source: World Bank, World Data Bank, World Development Indication, Sep. 2013

Figure 2- Comparison of Natural resource share of GDP between Iran, South Korea and Japan, 1998 -2008 –

2-1-4. The charge accounts and the velocity

Prior to the mid1960s, the Iranian economy, consisted of many economic agents, including many farmers and their labors who received the credit from stores to buy goods until they

received their incomes after harvest time. When buyers can delay their payments, the income velocity of money is greater than the case where they have to pay for goods in spot[1]. Therefore, the cash trade expansion is another case in which the formula shows a declining income velocity of money, while the actual circulation of money is on average constant. However, this case is not the focus of this study since from the second half of 1960s, in particular after the implementation of the land reforms, the traditional purchasing with delaying payments has rapidly been replaced by cash transactions. In addition, during the last two decades the credit cards and the modern trade credit have been expanded and this means that the circulation of money (and hence the income velocity of money) has been increasing.

2-2. Where has money gone?

The conclusion of the above discussion is that because of high inflation and interest rates the circulation of money has not been declining in Iran's economy. As long as the circulation of money isn't declining (or is assumed constant), if the ratio of irrelevant-to-GDP transactions to total transactions is constant, the ratio of money to GDP will be constant and thus the liquidity growth rate must be equal to the sum of inflation rate and real GDP growth. However, as mentioned before, when the liquidity growth is greater than the sum of inflation rate and real GDP growth, we can conclude that the liquidity has disproportionately been allocated to the irrelevant-to-GDP transactions (unproductive activities). A relevant question is that what activities and transactions have absorbed the extra liquidity? As mentioned before the unproductive activities include a very vast range from the illegal ones to those which are apparently productive but actually are not. Examining all of them in this paper is very difficult, or even due to the lack of data and statistical limitation is impossible. Therefore, this study focuses on real-estate activity (as this is perhaps the most important one) and how this sector has adversely affected Iran's economy in recent decades.

2-3. Real estate and money performance

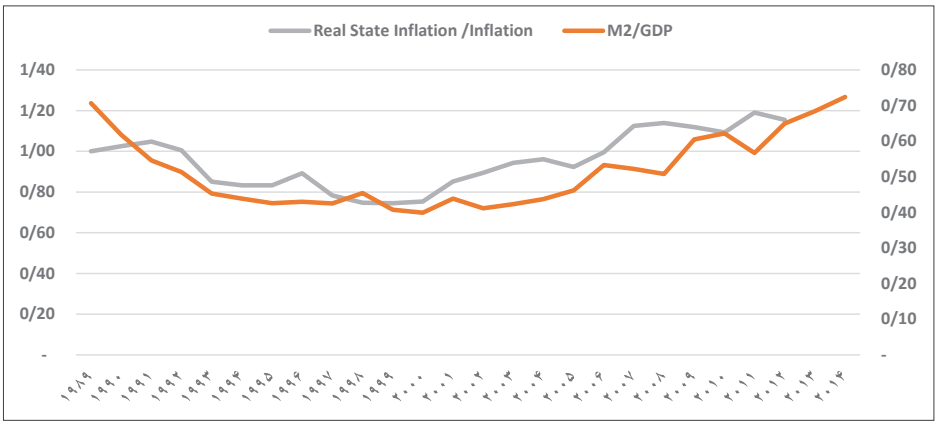
According to the Dutch disease theory, in natural-resource-based economies, like Iran, a proportion of the oil-boom revenues is spent on non-tradable goods (mainly services), which leads to an appreciation of the real exchange rate. This in turn draws resources out of tradable-goods sectors (primarily manufacturing) and into the non-tradable sector, to the extent that this tradable sector is exposed to international competition. Moreover, the increased profitability of a booming sector bids up the prices of factors of production (primarily wages and the cost of capital equipment), which results in a contraction of tradable sectors due to the higher costs of production.

1. For theoretic base of this see: Clower, Robert W., and Peter W. Howitt. "The transactions theory of the demand for money: A reconsideration" Journal of Political Economy 86, no. 3 (1978): 449-466.

This phenomenon may lead to an unbalanced growth across the sectors of the economy in favor of unproductive activities. When, for instance, the real estate sector is flooded with liquidity, its price index grows considerably faster than that of other sectors and yields higher profits, which in turn, attracts even more and more liquidity. Thus, in such a situation, real estate speculation expands very fast and the spiral of real estate price-money growth becomes more entwined. Recall Tobin's (1986) statement:

"We are throwing more and more of our resources, including the cream of our youth, into financial activities remote from the production of goods and services, into activities that generate high private rewards disproportionate to their social productivity."

This section focuses on the real estate sector (land and housing) which has absorbed a significant share of liquidity. In Iran's economy, there are some stylized facts implying that the real estate sector has deviated from its original function in recent decades. As Figure 3 shows, from 1989 to 2012, the ratio of real estate inflation to general inflation has fluctuated with the ratio of liquidity to GDP and this indicates that there is a dynamic interaction between liquidity and real estate inflation. (See Figure 3).



Source: Central bank of Iran

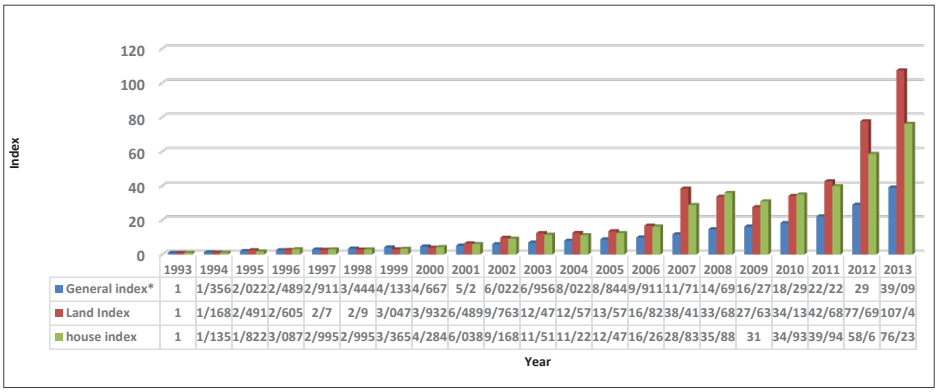
Figure 3- Liquidity and real state inflation have moved together

From 1989 to 2000, the ratios of M2[1]/GDP and real-estate inflation to general inflation have declined while both ratios have been increasing from 2001 to 2013. As mentioned before, assuming, because of inflation and interest rate status, the income velocity of money is constant, any increases in M2/GDP mean that the liquidity growth is greater than the sum of inflation rate and real GDP growth and vice versa. However, we believe that during the

1. Money (M1) includes currency and money in checking accounts (demand deposits). Traveler's checks are also a component of M1. Liquidity (M2) includes all of M1, plus savings deposits, time deposits like certificates of deposit, and money market funds.

downward trend of M2/GDP in some cases, circulation of money has increased due to the high inflation rates. In last three quarters of 1975 and first quarter of 1976, for instance, the wholesale inflation and CPI inflation rates were about 60% and 49.6% respectively. Based on the historical data and macroeconomic environment, we infer that as the M2/GDP declined from 1989 to 2000, either the ratio of irrelevant-to-GDP transactions to total transactions declined and circulation of money was constant or that ratio was constant but money circulation increased (or the former has declined and the latter has increased). However, we believe that when M2/GDP increased from 2001 to 2014, only the ratio of transactions changed. This would imply that the relationship between the ratio of irrelevant-to-GDP transactions to total transactions and M2/GDP is somewhat asymmetric.

As Figure 4 shows, in 2013 land and housing prices in Iran's economy were 107 and 76 times, respectively, more than they were in 1993, while the level of general prices has increased only 37 times more over the same 20 years.



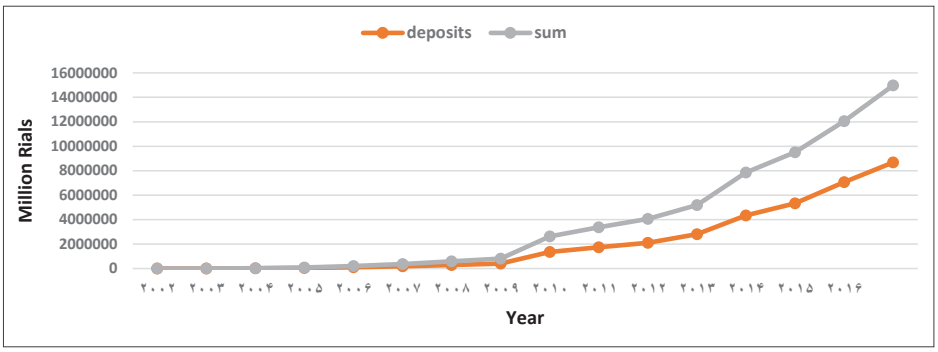
	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
General index*	1	1/356	2/022	2/489	2/911	3/444	4/133	4/667	5/2	6/022	6/956	8/022	8/844	9/911	11/71	14/69	16/27	18/29	22/22	29	39/09
Land Index	1	1/168	2/491	2/605	2/7	2/9	3/047	3/932	6/489	9/763	12/47	12/57	13/57	16/82	38/41	33/68	27/63	34/13	42/68	77/69	107/4
house index	1	1/135	1/822	3/087	2/995	2/995	3/365	4/284	6/038	9/168	11/51	11/22	12/47	16/26	28/83	35/88	31	34/93	39/94	58/6	76/23

Source: Statistical center of Iran

Figure 4- Land prices and housing prices in Iran have increased 3 and 2 times more than general price over the past 20 years

In other words, during this period, land and housing prices have increased 3 and 2 times more than the general prices. However, since the price indexes are the weighted average of prices across many regions, they do not reflect the actual variation and the extreme disproportionate changes in some regions of Tehran. The price of land, for instance, during the mentioned period in some neighborhoods of Tehran has increased more than one thousand times. As Figure 4 indicates, from 1993 to 2000 the growth of land and housing price indexes have been slower than the general price index while from 2000 to 2013 the formers have increased about 3.5 and 2.5 times more than the latter. In the first sub period, the relevant market forces have been main determinants of prices in the land and housing markets, but in the next sub period, the speculative activities have dominated the fundamental and relevant forces and have been the main determinant of land and

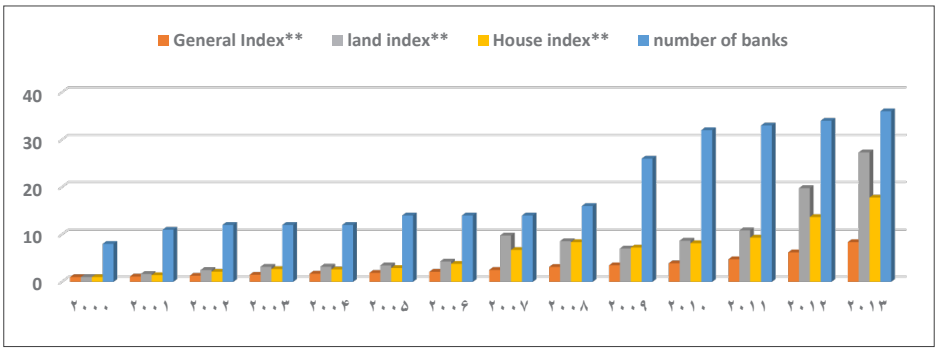
housing prices. Thus, the speculative activities in land and housing markets, instead of facilitating the stability and growth of the whole economy, have actually been a drag on economic growth., By increasing the opportunity cost of productive activities and absorbing the limited resources, these real-estate activities have deviated from their primary function, and as such should be considered as unproductive activities. In addition, so called private banks were exactly established and expanded in the second sub-period; these banks are neither competitive nor have any transparent performance and were not established by the real private agents. Instead of improving the competitiveness of the financial sector, the emergence and fast expansion of such banks, strengthened the monopolistic powers in the overall economy and in particular that of the financial markets. Due to the lack of clear and transparent performance reports, the official accounts of these banks are not reliable for assessing the allocation of their resources to various economic activities. For example, the value of total deposits in the banks must be equal to the sum of their total lending and (required, precautionary and idle) reserves. However, in the case of these so-called private banks, the deposits are considerably lower than the other two items and this gap has been widening over time. (See Figure 5).



Source: Central bank of Iran

Figure 5- Divergent paths of the deposits and the sum of lending and reserves

This widening gap indicates that these banks have themselves been involved in the speculative, rent seeking and monopolistic activities (such as speculation in land, housing, foreign exchange, international trade, stocks, and gold markets). As Figure 6 demonstrates, we attribute the main component of this gap to speculative activities in land and housing markets, since there is a high correlation between the disproportionate appreciation of real estate values and the number of private banks.



Source: Statistical center of Iran

Figure 6- The presence of private banks and real estate prices have experienced a much faster growth than general prices.

In Iran's economy, speculation in land and housing markets has changed the main function of the real estate activities and has pushed them toward unproductive activities through increasing the interest rates and opportunity costs and absorbing a considerable fraction of total GDP at the expense of reduction in income of productive agents (entrepreneurs, workers, capital owners) and therefor putting pressure on the productive sector. Thus, as a result of such a performance, the real estate sector has actually triggered an overall deep economic recession and then itself has also fallen into a prolonged recession. The prevailing prices in land and housing markets are not affordable for many households and thus the existing recession in real estate sector cannot be simply resolved by self-correcting forces. The disproportionate change in land and housing prices relative to the wages and general prices is the root cause of this recession and correcting such a distortion is very difficult.

The nonproductive sector includes a very wide range of activities but, due to lack of reliable data, we mainly focus on speculation in land and housing markets as the most important component of unproductive activities. We hypothesize that the excess liquidity growth over nominal GDP has flooded to extra irrelevant-to-GDP transactions and as argued before, under the prevailing situation in Iran's economy, these transactions are mainly unproductive. Therefore, the difference between the liquidity growth and the nominal GDP growth (inflation rate plus real GDP growth) is considered as a proxy of unproductive activities. The purpose of this study is to show this proxy of unproductive activities affects the total GDP negatively. In fact, we consider this proxy as a negative input and put it in total production function and estimate its impact on total production using an econometrics method.

3. Empirical framework, data, estimation, and results

In this section, we specify the total production function, investigate the features of our data, estimate the model, conduct the related tests and finally present the results.

3-1. Model specification

The literature on productivity and growth is vast and we do not aim to contribute to debates on the productivity theories but instead trying to explain the most influential and important facts related to the developing economies such as Iran. As discussed before, the accumulation of production factor does not guarantee accelerating growth and prosperity unless institutional environment, rules of the game and prevailing relative returns are in favor of the productive activities. We specify a Cobb-Douglas functional form for the total production and modify it in such a way that includes the proxy of unproductive activities. This proxy can be considered as a negative input or productivity indicator that explains the slowdown of productivity and growth in Iran's economy:

$$Y_t = AK_t^{\alpha_1} L_t^{\alpha_2} e^{\alpha_3(m_t)} e^{u_t}$$

Where Y_t is total production of the economy, K_t is total stock of capital, is total labor, L_t is the difference between the liquidity growth and the nominal GDP growth, u_t is the stochastic residual term and , A,a_1, a_3 and a_3 are constant coefficients. By taking logarithm, we can transform this nonlinear equation to a linear one:

$$\ln Y_t = \ln A + \alpha_1 \ln K_t + \alpha_2 \ln L_t + \alpha_3 m_t + u_t$$

3-2. Data and stationary test

Time series data for these variables range from 1975 to 2024 and are annual observations. Before estimating the model, it is important to investigate whether the variables are stationary to avoid a potential spurious regression as discussed by Phillips (1986). If the first and second order moments of a time series are constant over the time it would be weakly stationary, otherwise it would be nonstationary. However, nonstationary time series could be transformed to stationary ones by taking the difference. To investigate if our time series, are stationary or not the augmented Dicky-Fuller test, commonly-used in econometric studies, is performed:

Table 4- Augmented Dicky-Fuller test

symbols	statistics	Critical points		
	ADF	1%	5%	10%
LnGDP	-0.6714	-3.5924	-2.9314	-2.6039
DLnGDP	-6.9290	-3.5924	-2.9314	-2.6039
LnK	-0.7324	-3.5924	-2.9314	-2.6039
DLnK	-1.9633	-2.6150	-1.9484	-1.6121
LnL	-2.0663	-3.5847	-2.9281	-2.6022
DLnL	-4.8451	-3.5858	-2.9297	-2.6030
m	-4.3199	-3.5847	-2.9281	-2.6022

Where Dx denotes the difference of variable X. As Table 4 shows, while the time series of m (liquidity growth) is stationary (integration of order zero i.e., I(0)), all other variables are nonstationary (integration of order one i.e., I(1) and thus, their first order differences are stationary. Therefore, we have to use such an econometric method that is appropriate for the variables with different orders of integration.

Granger and Newbold (1974) argued that if there are some nonstationary variables in a time series model, we would likely fall in the spurious regression implying that while the estimated coefficients are apparently significant, they are, in fact, insignificant. However, Engle and Granger (1987) showed that, for example, if two time series variables are individually integrated of order one and a linear combination of them is integrated of order zero then they would be cointegrated of order zero implying the existence of at least one vector of coefficients that represents a long-run relationship between the variables.

3-3. Cointegration test

Before using the Autoregressive-Distributed Lag (ARDL) approach, we examine the existence of long run relationships(s) between our variables using a Johansen test for cointegration. According to the Schwartz criterion, the most appropriate specification for testing the cointegration includes an intercept and a trend … As the results in Table 5 show, the results of trace and eigenvalue tests indicate that there exists at least one cointegrating vector among the time series variables of our model that validates the existence of a long run relationship between them.

Table 5- Johansen Test for Cointegration,

Trace test				Maximum Eigenvalue test			
Null hypothesis	Alternative hypothesis	Statistics	Critical points of 95%	Null hypothesis	Alternative hypothesis	Statistics	Critical points of 95%
r=0	r≤1	26.6063	24.2759	r=0	r=1	18.6284	17.7930
r≤1	r≤2	7.9779	12.3209	r≤1	r=2	7.2138	11.2248
r≤2	r≤3	0.7640	4.1299	r≤2	r=3	0.7640	4.1299

If all of the time series variables are integrated of same order, maximum likelihood estimation method of Johansen (1991) would be the best approach for testing of cointegration vector. However, since our variables are integrated of different orders the ARDL model of Pesaran and Shin (1997) – is more appropriate. An additional advantage of ARDL approach is that it captures the short run dynamics as well as the long run relations. Since the (asymptotic) distribution of F statistics is not standard, Pesaran and Shin (1997) have themselves created an adjusted F statistics by simulation for testing cointegration and calculated the critical values that correspond to the number of the regressors and the existence of intercept and trend in the model.

3-4. Estimating the model

After validating the existence of a long run relationship between the variables we estimate the ARDL model. Considering the size of our sample (1975-2024), we use the Schwartz criterion to choose the optimum number of lags. The results of the estimated ARDL model are shown in Table 6. The estimated coefficients of capital stock (LK) and labor (LL) are statistically significant and have the signs that were theoretically expected. The estimated coefficient of the proxy of unproductive activities, m, is also significant with a negative sign. This confirms our hypothesis that the unproductive activities have a negative impact on the GDP. Thus, the liquidity growth in Iran's economy has been a drag on the economic growth.

Table 6- The results of Autoregressive Distributed Lag Estimates

The optimum lags for the independent variable and the regressors are 2, 0, 1, and 0 respectively				Independent Variable: LGDP
The names Of variables	Coefficients	Standard error	T statistics	probability
LGDP(-1)	0.5480	0.1375	3.9831	0.003
LGDP(-2)	-0.2674	0.1017	-2.6290	0.012
LK	1.9364	0.5054	3.8308	0.000
LK(-1)	-1.5680	0.4389	-3.5721	0.001
LL	0.4789	0.1108	4.3193	0.001
m	-0.1986	0.0637	-3.1180	0.003
C	-3.0727	0.6507	-4.7219	0.000
R squared = 0.989, R-bar squared = 0.9875 DW statistic = 1.8788 F statistic = 571.1183				

The statistics of the diagnostic tests related to this estimation are also shown in Table 7. The diagnostic tests examine if the estimated model satisfies the classical assumptions for the regression and its residuals. For all of these tests, the null hypotheses correspond to the violation of these assumptions, so the rejection of the null hypotheses means the estimated model meets the classical requirements. All null hypotheses related to serial correlation, functional form, normality and heteroscedasticity are rejected and thus the estimated results are robust.

Table 7- Diagnostic tests

classic assumption violation H0	Serial correlation	Functional form		normality	heteroscedasticity	
statistics	F	Chi2	F	Chi2	Chi2	F
value of statistic	0.2279	0.95589	0.73003	0.14419	9.970	1.846
probability	0.1681	0.328	0.401	0.930	0.126	0.116

The results of testing for the existence of a relationship among the variables at their level in ARDL model are presented in Table 8. Here, the null hypothesis is the lack of a long run relation between the variables. According to Pesaran's F statistic (2001), if calculated F is above the upper bound, null hypothesis of no relation is rejected, but if it is below the lowest bound the null hypothesis cannot be rejected and if it lies between the bounds, the test will be inconclusive. As Table 8 shows, the calculated F (8.7399) is above the upper bound, so there is a relationship among the variables at their level.

Table 8- Testing for existence of a relationship among the variables at their level in the ARDL model

F statistic	95% lower bound	95% upper bound	90% lower bound	90% upper bound
8.7399	2.79	3.67	2.37	3.2

Table 9- Estimated long run coefficients using the ARDL Approach

Independent variable is LGD 44 observations used for estimation from 1975 to 2024				
regressors	coefficients	Standard error	T statistic	probability
LK	0.5121	0.1208	4.2370	0.000
LL	0.6658	0.1470	4.5293	0.000
m	-0.2761	0.0986	-2.7991	0.007
C	-4.2714	0.6568	-6.5026	0.000

The estimated long run coefficients of the model are shown in Table 9. Capital (LK) and labor (LL) have positive long run and statistically significant effects on the GDP. The estimated long run coefficient for the proxy of unproductive activities, m, is significant and negative. This means such activities are a drag on the productivity and GDP. The results of the estimated ARDL model clearly show that unproductive activities limit the economic growth both in the long and short-runs.

The resulting error correction form of the selected model is specified as below:

$$\Delta LGDP_t = -\varphi(ecm_{t-1}) + \gamma_1 \Delta LGDP_{t-1} + \gamma_2 \Delta LK_t + \gamma_3 \Delta LL_t + \gamma_4 \Delta M_t + \varepsilon_t$$

where ecm_{t-1} is the error correction term, φ is the coefficient of adjustment speed and s are the short run coefficients. The estimated value of φ in table 10 indicates that about 72% of error (deviation from the equilibrium) would be corrected in each period. In other words, if a shock drives the model away from the equilibrium, about 72% of deviation is corrected in the first period.

Table 10- Error Correction coefficient of adjustment speed for the Selected ARDL Model

Dependent variable is dLGDP				
Regressors	coefficient	Standard error	T statistic	probability
ecm(-1)	-0.7193	0.1033	-6.9587	0.000

To validate the stability of the regression, we conduct the CUSUM (Cumulative Sum of Recursive Residuals) and CUSUMSQ (Cumulative Sum of Squares of Recursive Residuals) stability tests for the estimated ARDL model. As Figure7 indicates, the values of the test statistics and critical values at 5% significance level have been plotted and since the value of the statistics are between the upper and lower bounds of that critical values, the stability of the regression cannot be rejected.

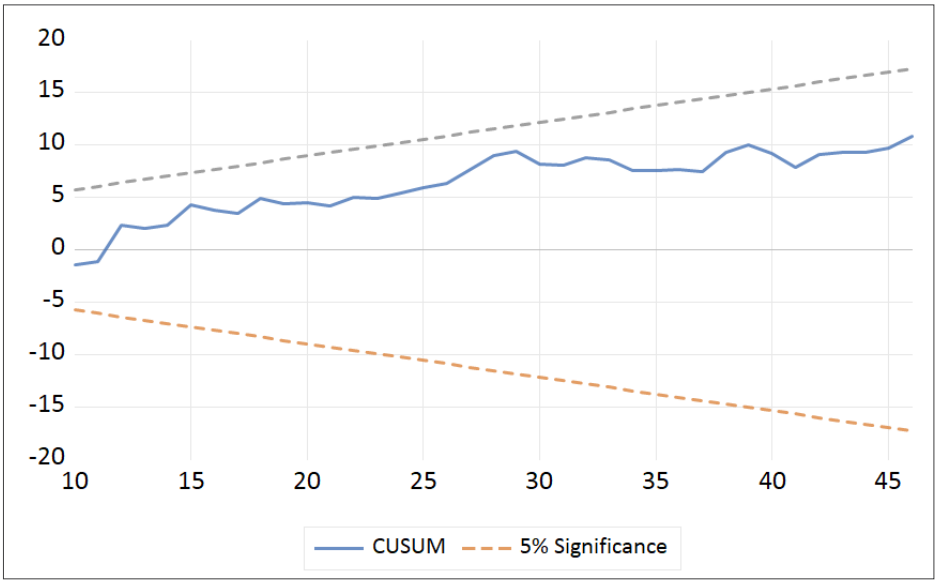


Figure 7- The stability test for the estimated ARDL model

4. Conclusions and implications

This paper has argued that in recent decades, the actual circulation of money in the Iranian economy has on average been constant, despite although the formula (the quantity theory of money) indicating that circulation of money has been declining. To explain this paradox, we discussed that the ratio of irrelevant-to-GDP transactions to total transactions has increased. Thus, the additional money corresponding to the difference between the liquidity growth and the nominal GDP growth rates has instead been exclusively flooded into unproductive activities. Economically unproductive sectors in Iran includes a vast range of activities such as speculation in land, housing, foreign exchange, international trade, stocks, and gold markets. All unproductive activities can be characterized by having a high rate of return without creating any real economic value. These unproductive activities absorb the limited resources and increase the opportunity costs for productive investments, and should be considered to be a drag on the economic growth and productivity of the country. Due to lack of data, we examined the real estate sector and showed that speculation in the land and housing markets and continuous dramatic increase in their prices correspond to the increases in liquidity to GDP ratio. Finally, by considering the difference between the liquidity growth rate and the sum of inflation and real GDP growth as a proxy of unproductive activities, we specified and estimated a macro-level production function which includes that proxy, using an econometric method. Our hypothesis was that the excess liquidity growth over the nominal GDP growth has been flooded into irrelevant-to-GDP transactions which are unproductive and thus has negatively affected both productivity and economic growth in Iran. The results found that the proxy for unproductive activities has a negative and statistically significant impact on the total production in Iran's economy implying that unproductive activities are a drag on both the economic growth and productivity. Diverting the resources from productive to unproductive activities is due to their relative returns and pay-offs matrix. The immediate implication of our results for Iran's economy is that economic-social planners and policy makers should know they couldn't accelerate the economic growth and achieve to a high productivity unless correct the rules and the pay-offs of the game. This would certainly require some institutional reforms in addition to reorientation of some of the existing socio-economic policies in Iran.

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