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Disaggregating the Credit Expansion: The Role of Changes in Banks' Asset Structure in the Business Cycle

Arkadiusz Sieroń

ABSTRACT: The aim of the article is to refine the Austrian business cycle theory by discussing the effect of changes in banks' asset structure on the business cycle. I disaggregate the process of credit expansion in the spirit of Cantillon's dynamic analysis of how the new money enters the economy, pointing out that banks can conduct the credit expansion not only by granting loans, but also by purchasing investment securities. I examine distinct results of those two methods and differences resulting from the type of purchased security or granted loans (the so-called secondary effects of business cycle). Based on my analysis, I propose a preliminary classification of business cycles.

KEYWORDS: Austrian business cycle theory, bank's asset structure, Cantillon effect, credit expansion, secondary effects of business cycle

JEL CLASSIFICATION: B53, E32, E44, E51, G21, N12

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> Credit takes various directions, and the effects of inflation can only be measured best at those points in the business structure where the use of credit has been most active.
>
> (Fraser, 1933, p. 81)

I. INTRODUCTION

The unique feature of commercial banks in the modern banking system is the ability to create deposits through the credit expansion based on the fractional-reserve mechanism. The nature of this phenomenon is well-known in the economic literature. Austrian economists consider it the cause of the boom-and-bust cycle (e.g., Huerta de Soto, 2006). Although true, it seems to be too general, because it does not take into account the fact that banks initiate the expansion of demand deposits not only by granting loans, but also by purchasing investment securities (Kent, 1947, pp. 131–132). The Austrian business cycle theory (ABCT) also does not distinguish among credit expansions related to different types of securities or loans.[1]

Neither Mises (1912; 1949), nor Hayek (1935) write about distinct methods by which banks can expand credit. Rothbard (1962, p. 437) claimed that "whether saved capital is channeled into investments via stocks or via loans is unimportant. The only difference is in the legal technicalities."[2] In illustrating deposit expansion, Rothbard (1983) and Huerta de Soto (2006) focus exclusively on granting loans, overlooking the fact that deposits can be created also by purchasing assets other than loans.[3] Machlup (1940) came close to the issue discussed in this paper, since he examined the effects of granting credits to the stock

[1] The same applies to mainstream economics. The only exception known to the author is Jordà et al. (2014) who analyze the rapid growth in the share of mortgages on banks' balance sheets in the second half of the 20th century.

[2] Rothbard wrote about "saved" capital; however, this does not change anything in this context.

[3] In fact, from the standpoint of the whole banking system, deposits may also increase by the public depositing cash. From the standpoint of the individual bank, deposits may increase also by transfer from other banks' accounts or bringing checks drawn upon other banks (Whittlesey et al., 1968, p. 112; Kent, 1947, p. 131).

exchange, not granting credits in general. However, he did not analyze the differences between distinct kinds of loans, because he was interested in discussing the question of whether the stock exchange absorbs capital. Bagus (2010) and Bagus and Howden (2010) disaggregate the loanable funds and take into account their different maturities. However, they focus on the time dimension of savings, while this paper disaggregates the credit expansion and takes into account different investment forms of banks' assets and the distinct purposes of the loans.

This omission in the ABCT is a bit puzzling, because "the purchase of investment securities by the commercial banks tends to have the same effect upon the volume of demand deposits as has the granting of loans" (Kent, 1947, p. 132).[4] There is no difference between these two cases—the proceeds either of loans or securities are placed in the deposit account of the borrower or seller. Undoubtedly, individual banks do not always grant loans to or purchase securities from their customers. However, for the banking system as a whole (even when banks buy securities in the open market), "the normal effect is to place demand deposits of equal amount on the books *somewhere in the banking system*" (Kent, 1947, p. 132, author's emphasis).

Banks' purchases of assets create deposits in the same manner as granting loans. It can also cause the boom-and-bust cycle, because buying securities reduces the interest rate, leading to entrepreneurial malinvestments in the capital-goods sectors. Investing either in bonds or stocks[5] affects interest rates and starts the reshuffling of the term structure of the interest rates and, consequently, of production. The bond market is perhaps easier to understand, since bonds are interest bearing. New funds flowing into this market raise their prices and lower yield. This makes other financial instruments more appealing and, through an arbitrage process, reduces the whole term structure of the interest rate (Philips et al., 1937, pp. 133–134).

[4] Perhaps this oversight results from the fact that until the creation of the Fed and before the start of World War I, commercial banks did not generally purchase investment securities (Steiner et al., 1958, pp. 130–132).

[5] For the sake of simplicity, I write about only stocks and bonds, although these two instruments are, of course, not the only types of securities.

The same process applies to purchases of stocks, even though they do not bear explicit interest. This is because the interest rate does not have to be established in the loan market, and directly reducing the interest rate on the loan market is not necessary to disturb the intertemporal market.[6]

Therefore, both buying securities and granting loans under the fractional-reserve banking system create new deposits and cause the business cycle. This paper analyzes the different results of these two distinct methods of money creation by commercial banks, and thus tries to refine the Austrian business cycle theory. In other words, I disaggregate the process of demand-deposit expansion in the spirit of Cantillon's dynamic analysis of how the new money enters the economy (Cantillon, 1755).

The remainder of the paper is organized as follows. Section II examines differences between purchasing securities and granting loans by the commercial banks on the business cycle. Section III further refines my analysis by considering different types of securities and loans. Section IV presents some empirics about the changes of banks' asset structure to illustrate their role in causing so-called secondary effects of business cycles (i.e., distinct features of each cycle). Section V proposes a preliminary classification of business cycles and concludes.

[6] Let us quote Huerta de Soto (2006, pp. 287–288): "The short-, medium-, and long-term loan market is simply a subset of that much broader market in which present goods are exchanged for future goods and with respect to which it plays a mere secondary and dependent role, despite the fact that the loan market is the most visible and obvious to the general public. In fact it is entirely possible to conceive of a society in which no loan market exists, and all economic agents invest their savings in production directly (via internal financing and retained earnings through partnerships, corporations, and cooperatives). Although in this case no interest rate would be established in a (nonexistent) loan market, an interest rate would still be determined by the ratio at which present goods are exchanged for future goods in the different intermediate stages in production processes. Under these circumstances the interest rate would be determined by the 'rate of profit' which would tend to equal the net income at each stage in the production process, per unit of value and time period." This can be most clearly seen in Iran, where all banks are forced to operate according to the Islamic law, which prohibits charging interest on religious grounds. See, for example, Delavari et al. (2011).

II. THE ROLE OF THE ASSET STRUCTURE IN THE BUSINESS CYCLE: LOANS VS. INVESTMENT SECURITIES

Although the banks' granting of loans and purchasing of securities both lead to the boom-and-bust cycle, it still matters how the new money enters the economy. What are the economic differences between these two channels and how they affect the course of the business cycle?

First, purchasing securities is more prone (i.e., quicker) than lending to cause a stock or bond bubble, because new money flows directly into asset markets. According to May (1935, p. 294), this way of distributing new money in the economy led to many subsequent changes: (1) the increase in the volume of securities flotation; (2) the increase in the number of investment banks and financial institutions; (3) the mergers and acquisitions of the banks and industrial companies; (4) the increase in the volume of the brokers' loans and loans "for the account of others"; and (5) the immersion of the commercial banking system in the speculative pool.

Second, funds flowing into securities markets lead to a unique kind of income and wealth redistribution. It benefits the financial sector more, at the expense of other sectors (Greenwood, Scharfstein, 2012). This is because new money does not enter into the economy evenly, as in Friedman's helicopter model (Friedman, 1969). First recipients benefit, because they have larger cash balances, but the prices have not yet changed (the Cantillon effect). Their spending causes a price increase of purchased goods, leading to consecutive changes (sellers' income will rise, and so also their spending, and so on) in the structure of relative prices and, consequently, redistribution of income and wealth (Cantillon, 1755). The creation of deposits by purchasing assets benefits also asset owners (the haves) at the expense of the have-nots (Hülsmann, 2013), increasing the wealth inequality. It is a distinct pattern of income and wealth redistribution than standard forced savings, described by Hayek (1935). And if banks do not grant loans to entrepreneurs, but buy Treasury bonds, they support the government and its spending.

Third, buying stocks or bonds can delay relatively the unsustainable boom. As long as the securities market absorbs the credit expansion in "speculative chain" (and does not simultaneously release other funds) the proceeds are not misallocated in the

production process, thereby prolonging the boom (Machlup, 1940; Bagus, 2007, p. 8).[7] The business cycle is not caused by the creation of credit per se, but by the allocation of these newly generated funds into more roundabout methods of production.

Fourth, acquiring securities can postpone relatively the necessary adjusting process during depression. This is because banks can purchase bonds and stocks when the demand for loans diminishes. Consequently, the process of credit expansion can last longer, leading to more misallocations in the structure of production. In particular, banks can choose to hold more Treasury securities, which supports government spending and additionally postpones the necessary adjusting process, crowding out the productive investments of the private sector.

Fifth, purchasing securities can lead also to greater monetary expansion: "the rise in security prices makes it easier for existing undertakings to secure overdrafts from the banks" (Robbins, 1934, p. 40). In other words, banks create money by buying assets, which also raises their prices. The more valuable assets then become collateral for further borrowing. Moreover, if the acquired financial instruments are "eligible to serve as reserve assets the system can create deposits and buy securities to an indefinite amount" (Prithard, 1964, p. 118). This is because commercial banks can buy Treasuries and submit these bonds to the central bank as collateral for loans, and then use the obtained funds in subsequent transactions. In addition, "if the central bank accepts those long term assets as collateral against new loans, the risk of maturity mismatching is reduced" (Bagus, 2010, p. 11), which can induce banks to lend more.

Sixth, buying securities can lower banks' liquidity more than granting loans. It depends, of course, on the type of loans they grant and kind of assets they purchase. For example, short-term loans are relatively quickly liquidated, by definition, but investments

[7] "Speculative chain" relates to a chain of security transaction in which nobody withdraws money from the asset market. In other words, the newly expanded credits can be used to purchase bonds and the sellers of these securities can also invest these funds to invest in bond market and so forth. Perhaps this is, at least partially, why the average duration of the business cycle in the United States was greater in the interwar period than pre–World War I and in most of the post–World War II era (NBER; Bergman et al., 1998).

must be sold, which can take some time, assuming banks are not eager to accept huge losses. Hence, perhaps it would be better to write that engaging in investments does not entail lower liquidity, but replaces liquidity with "shiftability." The former means "the capacity of the borrower to settle his note out of his current obligations" (Willis, Chapman, 1934, p. 528), while the latter means "the ability to sell the collateral secured to the loan." The shiftability approach implies that the liquidity of a bank in emergency depends on the possibility of shifting assets to stronger banks.[8] However, from the point of view of the whole banking system, it could be difficult to shift assets onto outside investors' balance sheets, especially during a recession (Philips et al., 1937, p. 106). This is important because the longer the period of liquidation of bad assets, the longer the recession (the misallocated assets during the boom have to be redeployed to truly productive projects, a process which requires liquidation).

Seventh, acquiring long-term assets[9] not only reduces the banks' liquidity, but also tends to lower the long-term interest rate, which could result in construction and real estate booms. In other words, the long-term investments (more remote from the consumers, such as construction or real estate) are prone to generate business cycles more quickly than short-term loans, because their impact on the long-term interest rate is more direct.

Eighth, purchases of securities weaken the central bank's ability to conduct monetary policy. Because money flows into the financial sector, the Fed cannot affect the "real" economy, at least not quickly. In the 1920s the Fed wanted to prevent an asset bubble and at the same time stimulate the economy, which was obviously impossible (May, 1935, p. 292). Also, because banks have financial assets, they can increase their loans without the additional reserves from the central banks, but only by selling those securities (Credit Flow Framework, p. 238).

To sum up, it is very important how the credit expansion is conducted: by loans or investments in securities. Certainly, lending

[8] On liquidity and shiftability, see: Mitchell (1923).

[9] Note that stocks are by definition long-term investments from the point of view of the whole economic system (Machlup, 1940).

is the core of the banking business and changes in the banks' asset structure between loans and investments in favor of the latter may be merely the indirect effect of the previous excessive granting of loans. Indeed, banks often purchase securities during depressions, when they either turn to safe instruments like government bonds (Klein, 1965, p. 72) or, faced with decreased demand for loans or lack of creditworthy borrowers, seek earning opportunities for reserves by purchasing higher-yield investments (Kent, 1947, p. 133; Philips et al., 1937, p. 90). In light of this, the fact that commercial banks acquire securities, except for the purpose of supporting the Treasury, can be considered an unintended consequence of monetary intervention in the banking market. However, the fact that "the banking statements themselves are a mirror in which national activity is reflected" (Bolton, 1963, p. 31) does not rule out that commercial banks, induced by the central banks, "cause certain directional impulses which in their turn affect the national economy, and thus by ricochet effect further changes in the banking system" (ibid. p. 31).

III. DIFFERENT KINDS OF INVESTMENTS OR LOANS

The above analysis can also be applied to the next level of disaggregation. Banks can choose not only how much new money they pour into the economy in the form of loans or securities, but also into which kinds of securities and loans. Let us focus on securities first.

1. Securities

The basic classification distinguishes among government securities and domestic securities other than governments.[10] The money that flows into government securities supports government expenditures and increases income and wealth redistribution from the private to public sector. It is worth pointing out here that this lending channel can also entail much higher (or earlier materialized) inflation of consumer goods and services because of income transfers and non-investment government expenditures.

[10] Buying foreign securities transmits inflation and the business cycle abroad, and supports exporters (eventually, the currency has to return to the issuer's country).

Purchasing domestic securities other than government bonds does not directly support government spending or credit expansion abroad. However, it may also cause a securities bubble. This category can be further divided. I analyze briefly the differences between buying stocks and bonds. The differences are not merely technical–important aspects of the pattern of income and wealth redistribution (i.e., the Cantillon effect) depend on the type of securities purchased. First, the stock boom affects different agents than does the bond boom. Pension funds and households, which hold mainly stocks, usually benefit more from the stock boom (due to relative rise in stock prices), while insurance companies and foreign investors, which possess mainly bonds, benefit from the bond boom (Board of Governors of the Federal Reserve System, 2014). However, stocks are very unevenly distributed among households. According to Wolff (2010), the richest 10 percent of households in the USA accounted in 2007 for 81 percent of the total value of stocks. This is why the rise in the stock prices leads to the increase in wealth inequality. Moreover, bonds, and not stocks, are fixed-income instruments. Therefore, they can be more directly sensitive to changes in the interest rate (Bagus, 2007, p. 13), and their real price will be more negatively affected by price inflation.

Second, a stock boom due to credit expansion can fuel additional growth in stock prices because these instruments are typically chosen by investors in times of prosperity, while bonds are considered more defensive instruments.[11] This is related to the fact that investors perceive stocks as riskier instruments, such that when the interest rate is lower, stocks become more attractive due to the risk premium and, in consequence, offer a higher potential rate of return. In other words, the arbitrage process occurs slightly faster from bonds to stocks than from stocks to bonds in the case of a monetary injection in the expansion phase and slightly slower

[11] As Bagus (2007, p. 5) points out: "After the asset price boom has been triggered by credit expansion, it is fueled by waves of optimism pervading the whole economy. This optimism, instead of fueling all asset prices simultaneously, might concentrate on one or more of these areas, i.e., stocks, bonds, or real estate." In other words, due to credit expansion, investing in stocks (in comparison to bonds) nowadays depends more on the rise in prices than on regular income in the form of dividends.

in the contraction. Moreover, stock prices seem to increase faster during the boom also because investors see them, more than bonds, as titles to the underlying capital goods.

2. Loans

"The type of economic activity which is supported by the extension of bank loans influences what is produced, how much of each product is produced, as well as where the products are turned out" (Steiner et al., 1958, p. 134), so it is very important what kinds of loans are granted. Loans can be classified according to many criteria;[12] however, this article classifies them by use and distinguishes between real estate loans, loans on securities (investment loans), consumer loans other than for real estate, and business loans other than for real estate.

Real estate lending creates distinct effects from those resulting from credit expansion driven by other types of loans. First, it increases the price of real estate, which enriches its owners[13] but has a negative impact on marginal buyers and people who rent real estate (higher prices cause less demand for rentals). In other words, it entails income and wealth redistribution in favor of housing and related sectors, such as the construction sector. Second, it lowers the liquidity of the financial system, since it is relatively difficult to sell houses quickly. Third, it can reduce the mobility of workers and, in consequence, impair the efficiency of the labor market (Ferreira et al., 2012). The less flexible the labor market, the longer the recession. Fourth, because houses are usually the dominant part of people's wealth, it can lead to increased consumer spending due to the wealth effect (Carroll et al., 2006). Fifth, real estate lending generates debt overhang among

[12] Such as the kind of collateral, type of borrower or maturity. On the term structure of savings, see: Bagus (2010); and Bagus, Howden (2010).

[13] It is worth noticing that houses are more equally distributed in the society than stocks. The richest 10 percent of households in the USA accounted in 2007 for 81 percent of the total value of stocks, while they possessed only 38 percent of the value of owner-occupied housing (Wolff, 2010, p. 20). Therefore, it can be argued that extending real estate loans does not increase income and wealth inequality as much as investments loans or purchasing securities.

households,[14] which lowers financial stability and typically leads to deeper recessions and slower recoveries (Jordà et al., 2014).

Extending investments loans has very similar effects to the direct purchases of stocks and bonds, i.e., an increase in prices of securities and income and wealth redistribution in favor of financial institutions. The main difference with the Cantillon effect is that extending investment loans supports borrowers.[15]

Banks can introduce newly created funds indirectly, through the stock market, or directly, in loans to entrepreneurs as commercial and industrial loans. There are many types of credit available to businesses; however, they all share one important distinguishing feature. It seems that funds that enter the economy through markets other than financial-asset markets can cause inflation of the commodity prices much more quickly, because new money entering into asset markets can stay there for some time.

Consumer loans are a very distinctive type of credit, in that they do not lengthen the structure of production, but actually shorten it, provided the proceeds do not finance durable goods,[16] but current consumption, and do not release other funds for financing industries in the stages furthest from consumption (Huerta de Soto, 2006, pp. 406–407). They also entail different patterns of income and wealth redistribution. Specifically, they give customers, not entrepreneurs, newly created funds. One beneficiary of this type of monetary injection may be the automobile industry, because proceeds are often used to purchase cars.[17] On the other hand, it can be more harmful (or its negative effect can come more quickly) for the rest of consumers—those not given the loans—due to increased consumption outlays and, in consequence, higher consumer-goods price inflation.[18]

[14] According to Jordà et al. (2014, pp. 14–15), "household borrowing accounts for about 2⁄3 of the total increase in bank credit since 1960, predominantly driven by real estate lending." In consequence, the household debt to asset ratio has risen substantially in many countries.

[15] Another difference is that loans seem to be more easily liquidated.

[16] Consumer durable goods are very like capital goods; however, it seems the increase of the supply of capital goods tends to raise labor productivity much more.

[17] Moreover, some of the commercial and industrial loans come from the sales-finance companies, who in turn supply credit to consumers (Cochran, 1971, p. 152).

[18] It can also entail social effects such as a raise in the social rate of time preference and the growth of consumerism, which leads to lower economic growth and a slower pace of recovery due to a lower volume of savings.

IV. EMPIRICAL EVIDENCES

In the previous sections I provided theoretical considerations about the differences between the ways how commercial banks create demand deposits, i.e., whether they buy securities or grant loans, and what kind of securities they buy or loans they grant. In this section, I present some empirical evidences from the USA that the form of the credit expansion and changes in the banks' asset structure really do matter.

Before World War I, commercial banks granted mainly short-term commercial loans. However, such factors as the increasing practice of entrepreneurs' financing through the securities market, the improvement of the art of analyzing securities' worth, and the inflow of funds available to the banks due to the loose monetary policy of the newly created Federal Reserve Bank contributed to the rise in securities' share in the banks' balance sheets (Willis and Chapman, 1934; May, 1934b).

During World War I and shortly after it, government securities played a key role. In 1916 government securities equaled slightly less than one-third of all investments of national banks. In 1919 such obligations constituted 62.8 percent of their total investment portfolio, and 50.2 percent in 1921 (Kazakévich, 1934, pp. 571–574). Between March 1917 and June 1919, loans increased 70 percent and investments in government securities 450 percent, while between March 1917 and June 1920 total investment of all Federal Reserve member banks increased 130 percent and investments in governments increased 300 percent (Philips et al., 1937, p. 34). Therefore, it can be argued that the expansion and the short depression that followed in that time were driven, at least partially, by the changes in banks' holdings of government securities.[19] Indeed, to fund World War I, "the federal government induced the banks to expand their portfolios by buying bonds and providing loans secured by the purchase of bonds" (White, 2009, pp. 35–36). The money that flowed into this kind of security enabled enormous government expenditures on its military and increased income and

[19] These changes should be attributed to the amendment of the Federal Reserve Act of 1916, which "made it possible for national banks to convert their holdings of government bonds into other forms of credit through the use of the rediscount privilege" (Kazakévich, 1934, pp. 574–575).

wealth redistribution from the private to public sector. That period is also an example of how purchasing (government) securities can lead to greater monetary expansion. Between March 5, 1917 and June 1918 the increase of almost seven billion dollars in total loans and investments of Federal Reserve member banks "indicates how the creation of credit by the purchase of Government securities [by $1.78 billion] led to a multiple expansion of loans and investments in the entire banking system" (Philips et al., 1937, p. 34).

The boom in the 1920s in the United States, which preceded the Great Depression, occurred to a great extent as a result of the growth of banks' investments holdings and loans to brokers, as well as real estate loans.[20] Indeed, investments in securities of national banks increased from 23.5 percent of total loans and investments in 1920 to 31 percent in 1929 (Kazakévich, 1934, pp. 576–582). Between March 8, 1922 and December 29, 1926, investments of national banks increased by 52.8 percent,[21] while total loans and investments increased by only 38.4 percent (Willis, Chapman, 1934, pp. 529–530).

The impact of the investments on the securities bubble was strengthened by lending on collateral of stocks and bonds. Between 1921 and 1929, the volume of investment loans of Federal Reserve member banks increased from $3.7 billion to $8.3 billion (May, 1934b, p. 616). The share of investments loans in all loans of all national banks increased from 22.5 percent to 34.6 percent of total loans (Kazakévich, 1934, p. 556). According to Bordo and Wheelock (2004, pp. 20–21), brokers' loans rose rapidly and in line with stock prices, while neither the money stock nor total bank credit grew at

[20] The 1920s (and 1910s) witnessed also the significant rise in the volume of foreign securities in the banks' balance sheets. Between April 28, 1909 and June 30, 1932 the volume of foreign securities held by all banks in the United States increased by 23.6 times, from $24.6 million to $580.8 million, while the total assets rose by only 2.71 times (Kazakévich, 1934, pp. 550–551). This is why, according to Robbins (1934, p. 49), "the inflation was not confined to America, although it was that part of the world that some of its most characteristic manifestations were witnessed. An enormous volume of foreign loans spread out to other centres and generated expansion there."

[21] The share of loans on securities increased by 65.8 percent (Willis, Chapman, 1934, pp. 529–530). Between 1922 and 1931, security investments of national banks increased by 60.2 percent, while commercial loans decreased 17 percent (May, 1934a, p. 536).

an unusually fast pace during 1923–1929.[22] This fact confirms my main thesis that it is worth looking at credit expansion in a more disaggregated manner.

The example of the Roaring Twenties seems to show also the important role of real-estate loans in the business cycle. Real estate loans flourished during the 1920s in the United States, contributing to the real estate boom and following bust.[23] Indeed, total real estate loans of national banks increased from $184 million in 1919 to $725 million in 1926, which corresponded to an increase from 1.7 percent to 7.6 percent of total loans (Becker, 1934, pp. 591–595).[24]

According to Philips et al. (1937, pp. 103–104, author's emphasis), "although loans on securities and loan on real estate are technically classified as *loans*, the actual character of many such assets was such as to cause them to stand in much the same relation to the process of inflation as did *investments* proper."[25] In consequence, purchasing securities, loans on securities and on real estate entailed similar effects, such as lowering banks' liquidity and long-term interest rate. Banks' investment in securities in the 1920s entailed the lengthening of the banks' asset maturity. In consequence, as Philips et al. (1937, p. 81) point out, "the liquidity of banks declined in general to such an extent that they were ill-prepared to cope with the situation which arose when stock market crash placed an unduly severe pressure on the banking structure." Real estate loan had a similar effect on banks' liquidity. According to Becker (1934, p. 608), "excessive real-estate lending has unquestionably

[22] Contrarily, according to Rothbard (1963, p. 93), between June 30, 1921 and June 30, 1929 the total money supply increased by $28 billion, or about 61.8 percent, a very sizable degree of inflation.

[23] "A boom in real estate comparable to that in bonds and shares of industry took place throughout the second half of the decade of the 'twenties. Beginning in Florida, it gradually extended throughout the whole country. Bank portfolios became farther and farther swollen with real-estate investments" (Becker, 1934, p. 589).

[24] Loans on real estate do not represent all real estate commitments of national banks, as these banks also bought real estate bonds (Kazakévich, 1934, p. 559).

[25] However, there are strong arguments against regarding loans and investments as perfect substitutes. Investments seem to affect the securities market in a more direct way. Perhaps this is why a slight decrease in investment from 1928 to 1929, and an increase of loans on securities and real estate, depressed the bond market and caused a rise in the interest rate on corporate securities (Philips et al., 1937, p. 104).

contributed during the decade 1920 to 1930 to the increasingly unliquid position of American banks, and has been a major factor in bringing about a 'tied up' position which has doubtless often contributed to suspensions and failures" (Becker, 1934, p. 608).

The years preceding the Great Depression witnessed also the decline in the long-term interest rates, which resulted in a construction and real estate boom.

> As a result of the plethora of bank credit funds and the utilization by banks of their excess reserves to swell their investment accounts, the long-term interest rate declined and it became increasingly profitable and popular to float new stock and bond issues. This favorable situation in the capital funds market was translated into a constructional boom of previously unheard-of dimensions: a real-estate boom developed, first in Florida, but soon was transferred to the urban real estate market on a nation wide scale, and, finally, the stock market became the recipient of the excessive credit expansion. (Philips et al., 1937, p. 81)

Additionally, these banks' long-term investments provoked some pro-cyclical feedback. Lower long-term interest rates induced entrepreneurs to retire short-term banking debt and to float bonds and stocks. Banks faced a decrease in demand for loans, so they eagerly absorbed new issues, further decreasing long-term interest rates and, in consequence, strengthening the construction and real estate booms (Philips et al., 1937, p. 111). In other words, huge purchases of investment securities and investment-like loans (on securities and real estate) caused the real estate bubble and stock market bubble, which eventually burst in 1929.

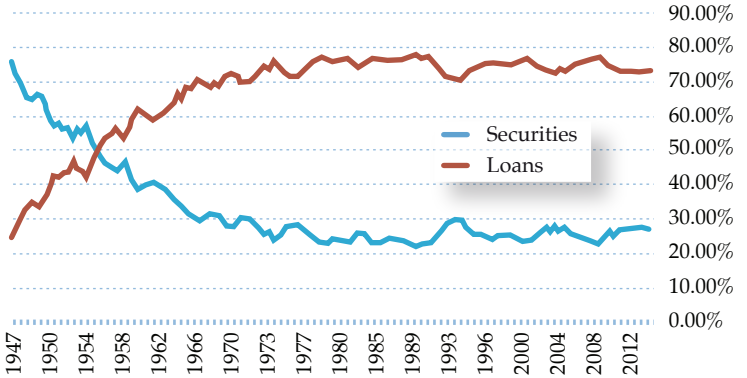
Indeed, the stock market crash in that year was caused by the selling of investment securities by the commercial banks in order to increase the volume of loans on real estate and securities (Philips et al., 1937, pp. 103–104), which confirms that the form of the credit expansion and changes in the banks' asset structure really do matter.

The 1930s and World War II were periods when another important stream of money was flowing into government bonds. Indeed, the share of loans in the portfolios of the Federal Reserve member banks decreased from 71.2 percent in 1925 to 38.9 percent in 1936 and to 22.8 percent in 1946, while the holdings of government bonds increased by nineteen times and their share increased from 12.1 percent to 70.9 percent between 1925 and 1946 (Kent, 1947, pp. 247–248). Between December 1939 and December 1945, commercial banks increased

earning assets by $83 billion, of which $73.3 billion was allocated into government securities (Pritchard, 1964, p. 111). Buying government bonds could postpone the necessary adjusting process during the Great Depression, because it supported government spending and crowded out the productive investments of the private sector. It also allowed banks to pay too little attention to the quality of their other assets and gave them a ready means of access to the funds from the Fed, even thought their investment and lending policies did not warrant it (Shere, 1935, p. 877).

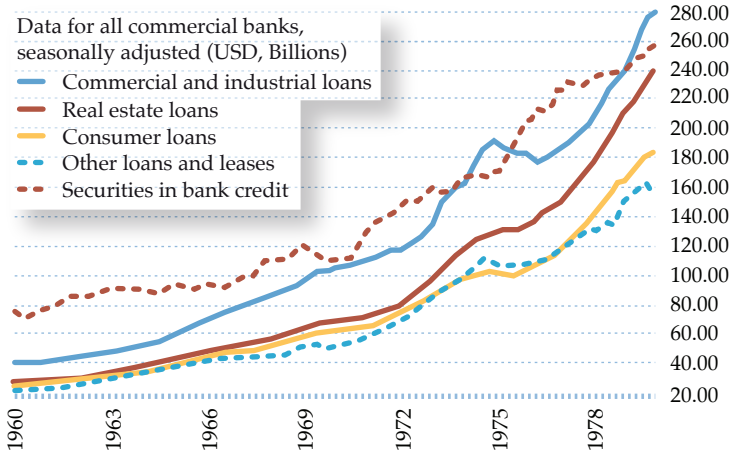
My disaggregated approach can be successfully applied to the postwar era. As can be seen in Figure 1, from 1947 to the 1970s, the share of securities in commercial banks' total loans and investments was decreasing. This does not mean that securities became an unimportant channel of banks' lending. We can clearly see this in Figures 2 and 3, which show the volume of different types of loans (commercial and industrial, real estate, consumer, and other) and securities during the 1960–1980 and 1980–2014 periods. Purchasing securities (red dashed line) was a very important channel of credit expansions in both periods. In 1970s it was usually the most significant category, and since the beginning of 1990s securities were outstripped only by real estate loans (red solid line).

Figure 1: Banks' securities and loans shares from January 1947 until May 2014, monthly, seasonally adjusted



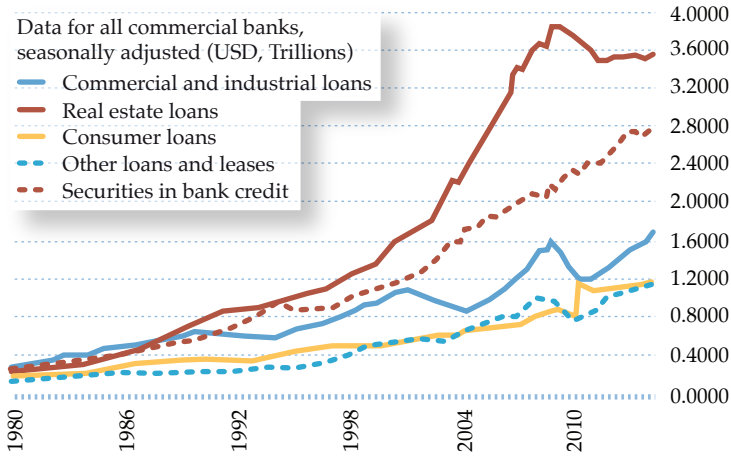
Source: Board of Governors of the Federal Reserve System, H.8 Assets and Liabilities of Commercial Banks in the United States for June 13, 2014, http://www.federalreserve.gov/releases/H8/, June 23, 2014.

Figure 2: The volume of different types of loans and securities between 1960 and 1980



Source: Board of Governors of the Federal Reserve System, H.8 Assets and Liabilities of Commercial Banks in the United States for June 13, 2014, http://www.federalreserve.gov/releases/H8/, June 23, 2014.

Figure 3: The volume of different types of loans and securities between 1980 and 2014



Source: Board of Governors of the Federal Reserve System, H.8 Assets and Liabilities of Commercial Banks in the United States for June 13, 2014, http://www.federalreserve.gov/releases/H8/, June 23, 2014.

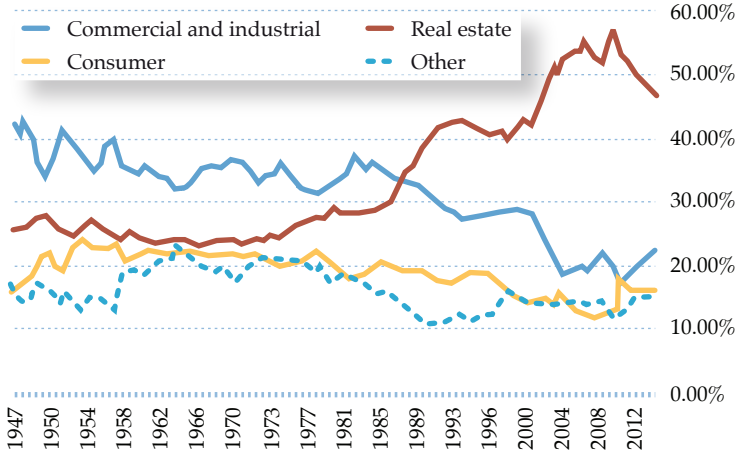
These figures show two things. First, between the 1960s and the mid-1980s commercial and industrial loans (blue solid line) were very important, if not the dominant channel of the credit expansion. The expansionary monetary and credit policy that started in the mid-1960s may, thus, account for the commodity boom in the 1970s (Bordo and Lane, 2013).[26]

Second, the volume of real estate rose from the mid-1980s to 2009, and its share of total loans also significantly increased.[27] This can be seen in Figure 4, which presents the structure of commercial banks' loans between January 1947 and May 2014. There cannot be any doubt that this shift was the most important factor contributing to the real estate bubble in the 2000s. The real estate boom was accompanied by the increased consumer spending due to wealth effect (Carroll et al., 2006), while the housing bust reduced the households' mobility (Ferreira et al., 2012). The increased household indebtedness (due to mortgage lending) may also explain the slow pace of recovery from the global financial crisis of 2007–2008 (Jordà et al., 2014).

[26] Another example of the important role of commercial and industrial loans in the business cycle may be the Weimar hyperinflation. Though speculation was active then, "the funds available for purchases of stock were relatively slim. The mounting commodity prices absorbed so large a proportion of the monetary supply that relatively little was left for the working of the financial markets, and *the banks were not inclined to put credits at the disposal of stock speculators*" (Graham, 1930, p. 65; emphasis added).

[27] Jordà et al. (2014) provide a long-term and international analysis. According to their research, the average share of mortgage loans in banks' total lending portfolios in 17 advanced economies has roughly doubled over the course of the past century, from about 30 percent in 1900 to about 60 percent in 2011.

Figure 4: The structure of commercial banks' loans and securities between January 1947 and May 2014



Source: Board of Governors of the Federal Reserve System, H.8 Assets and Liabilities of Commercial Banks in the United States for June 13, 2014, http://www.federalreserve.gov/releases/H8/, June 23, 2014.

V. CONCLUSION

In another work (Sieroń, forthcoming), I classify different possible manifestations of the Cantillon effect according to the way in which new money enters the economy. Credit expansion is one of the channels—the most important in our times.

However, there is no reason to stop the analysis of the distribution of the new money on such a general level. This paper disaggregated the process of credit expansion and tried to show that it matters how the commercial banks conduct it. There are important differences in the business cycle depending whether banks expand credits or purchase securities, and depending what kind of loans they grant or what type of asset they buy.[28]

[28] There is one obvious counter-hypothesis I would like to address here: that the composition of bank assets does not cause the business cycle, but that the business cycle causes bank asset compositions, i.e., banks lend heavily to sectors, which are

Various kinds of bank loans or investments in securities can drive the boom-and-bust cycle. The preliminary classification distinguishes between business cycles driven mainly by (1) the stock market (direct purchases and investments loans), as during the 1920s preceding the Great Depression; (2) government bonds, as during World War I, 1930s and World War II; (3) the real estate market (loans and mortgage securities), as with the 2000s' boom-and-bust cycle; or (4) commercial and industrial loans, as during the 1960s and the 1970s. These distinct channels do not affect the basic mechanism of the business cycle, but are responsible for differences in their so-called secondary effects. Perhaps more detailed classification and further disaggregation of data on banks' loans and securities will enable us to make more precise, but still qualitative, predictions about the business cycle.

At first glance, the finding that, for example, the housing sector will be affected first and most if the new money that enters into it seems rather trivial. However, different ways of distributing new money in the economy lead to some distinct secondary effects of the business cycles. In the example of the housing sector it may be the wealth effect, reduced labor mobility or longer liquidation and slower recovery. Moreover, it is always worth saying it explicitly, because only a few economists tie credit to asset bubbles. I strongly believe that such an analysis of the role of changes in the banks' asset structure can improve our understanding of the role of monetary inflation (more precisely: credit expansion) in the business cycle.

Obviously, this article is by no means conclusive. To fully understand how the Cantillon effect arises through credit channels, we need (1) to disaggregate the main types of loans

already experiencing growth (for non-credit reasons). Surely, as I have already written in the second section, banks, as almost any entity, have to react to external factors and modify their balance sheets in response to changes in the market conditions and government regulations. However, the rationale behind the credit expansion does not rule out the fact that it leads to the business cycle. Similarly, the causes of changes in the bank asset composition (methods of credit expansion) do not rule out the fact that they are responsible for the secondary effects of the business cycles. Banks can lend to sectors, which are already flourishing, however the credit expansion based on the fractional-reserve is what transform the real bloom into artificial boom.

and securities even more;[29] and (2) to examine how this money is spent by borrowers.[30] Future research of the credit expansion in a more disaggregated manner may also include (1) the analysis of the impact of different credit expansion channels on the process of liquidation; (2) the examination of the role of the derivatives and securitization in the business cycle, or the role of banks' off-balance sheet activities in the business cycle; (3) the analysis of distinct methods how the central banks can conduct monetary policy and influence the money supply and commercial banks' activity; and (4) the examination of the potential differences between the course of the business cycle, depending on who enters (and transmits) new money into the economy.[31]

However, the author hopes that this article helpfully refines the Austrian business cycle theory, since although some incidental references were made in the past to the making of bank loans and investments as a part of the process of creating deposit currency, "no attention was (…) given to the various purposes for which credit is extended or to the relationship of the commercial banks to the financial and economic system as a whole" (Moulton, 1935, p. 91).

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[29] For instance, further disaggregation of real estate loans, e.g., into residential and commercial real estate loans, seems to be especially needed.

[30] For example, "in the United States, huge issues of Liberty bonds were sold to the public, which was encouraged to borrow the funds necessary for the purchase of these bonds from the banks and to redeposit the latter with the banks as security for the advances. The banks in turn were enabled to lend these funds to the public by the readiness of the Federal Reserve banks to extend loans to banks on the basis of governments bonds at preferential discount rates" (Murad, 1935, p. 223). The end result was very similar to the direct purchase of bonds by the banks (except with a different pattern of income and wealth redistribution). Another study might concern the proceeds spent on foreign goods, which are often returned to the US asset market.

[31] On the two last issues, see: Sieron (forthcoming).

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The Interest Rate and the Length of Production: An Attempt at Reformulation

Mateusz Machaj

ABSTRACT: Austrian economists since the time of Böhm-Bawerk have argued that lowered interest rates lead, in general, to longer production processes. Recently Hülsmann (2011) and Fillieule (2007) have challenged this argument and demonstrated with mathematical precision that lowered interest rates shorten production processes. This paper argues that it may be misleading to search for a direct causal effect of interest rates on the length of production because another, related factor affects it more directly. We name this factor *intertemporal labor intensity*, since it has to do with the moment of hiring labor. We discuss the relationship between savings and the interest rate, and modify a textbook depiction of the structure of production by changing interest rates. After explaining the concept of intertemporal labor intensity, the paper discusses a crucial assumption of Hülsmann (2011) and Fillieule (2007) on the ratio of labor to capital.

KEYWORDS: capital theory, interest, production structure, Böhm-Bawerk

JEL CLASSIFICATION: B13, B53, D24, E43

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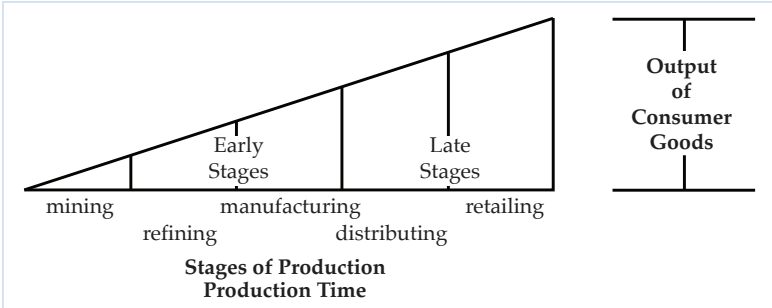
INTRODUCTION

Representatives of the Austrian school, starting with Böhm-Bawerk, have developed a unique way of presenting capital structure in the form of consecutive stages. Friedrich von Hayek reflected on the issue deeply and presented it in geometric terms. His follower Roger Garrison has developed the concept of what he calls the Hayekian triangle (Garrison, 2001, pp. 11, 47):

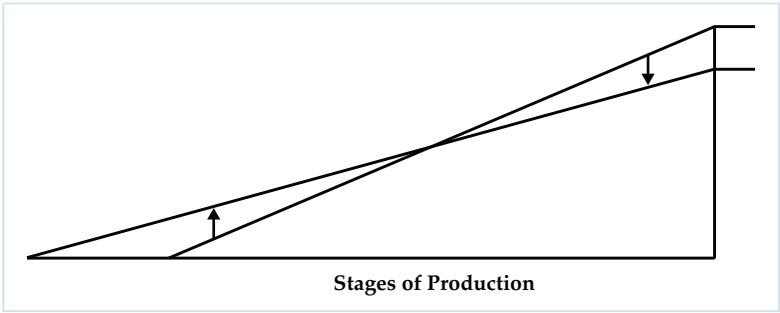
Figure 1: Garrison's Hayekian Triangle



As the diagram shows, in the beginning of the production process, firms only employ complementary primary factors: time, labor, and land. They develop capital goods, the product of primary factors, which are sold to another capitalist entrepreneur. The next capitalist then employs those transformed goods with additional labor and natural resources. The next capitalist acts in a similar manner, and so forth, until the product reaches the consumption stage. In every step, the capitalist employs a mixture of primary factors and capital goods.

In Garrison's approach, with more capital accumulated, consumption on the vertical axis decreases, and production lengthens, freeing up factors from later stages to be employed in earlier stages (Garrison, 2001, p. 62):

Figure 2: Increased Savings and a Decreased Interest Rate in Garrison's Hayekian Triangle

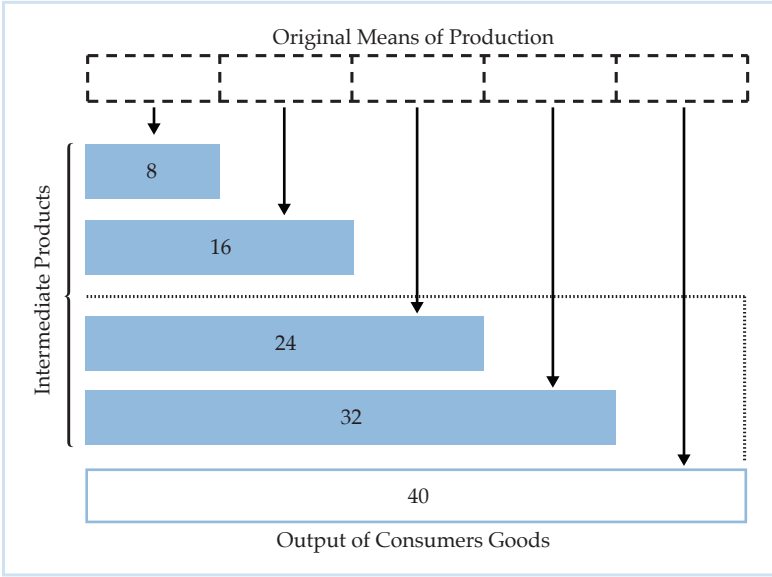


The most problematic feature of this presentation is that it does not use purely monetary terms (cf. Hülsmann, 2001, p. 40). A clearer way of illustrating production would require presenting monetary factors. Setting the subject of monetary versus real phenomena aside, it is worth noting that Hayek did not in fact use "triangles," but rather trapezoids. Why is this relevant? In triangles, the line starts from the bottom, so the production process has to begin with zero expenditures, which in capitalist production is clearly not the case. Hayek seemed to have been aware of this point, since he did not draw triangles. In fact, there is no such thing as a Hayekian triangle.[1]

Hayek envisioned a trapezoid in the following way (Hayek, 1931, p. 233):

[1] Hayek may be the author of this confusion, since he called the structure a triangle (Hayek, 1931, p. 228), even though he presented it later as a trapezoid. Also as Jacob Marschak notes (Hayek, 1931, p. 229), these figures are actually Jevons's investment figures (see Jevons, 1957, p. 230). Perhaps it would be more historically accurate to talk about Jevonsian trapezoids rather than Hayekian triangles.

Figure 3: Hayek's Trapezoid



The remainder of this paper is structured as follows: The first section briefly presents the problem posed by Hülsmann and Fillieule. The second section discusses how savings drive the interest rate. The third section deals with a textbook example of the structure of production. The fourth section modifies the example by changing interest rates. The fifth section introduces the concept of intertemporal labor intensity. The sixth section discusses a crucial assumption of Hülsmann (2011) and Fillieule (2007) regarding a fixed labor to capital ratio. The last section concludes.

1. THE AUSTRIAN CAPITAL THEORY OF BUDGET CONSTRAINTS

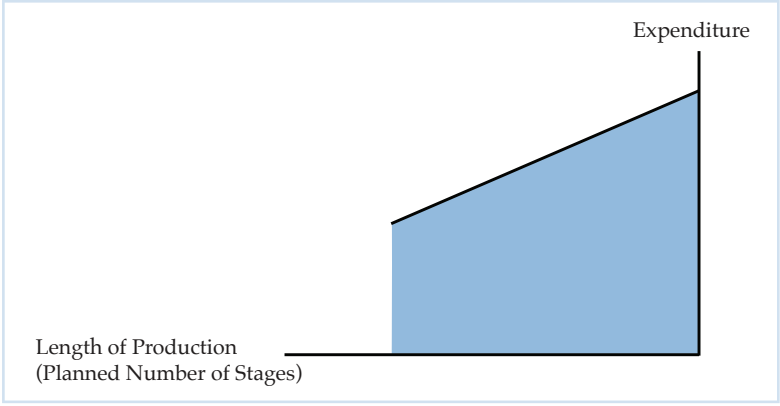
What has been often missing in discussions about capital theory is the basic element of microeconomic theory: budget constraints.[2] This appears quite natural, since economists usually consider

[2] Hayek too seems to have at least slightly neglected that fact (Hayek 1931, pp. 233–243).

capital theory on the macro scale and in real terms (depicting aggregated processes). Yet it seems critical to also include budget lines in capital and interest considerations, because we analyze capital in monetary terms, and interest as a real-world phenomenon is always presented as monetary. In the framework of equilibrated trapezoids, this requires one to assume fixed total spending, as Rothbard does in *Man, Economy, and State* (2004, pp. 517–527).[3] Of course, in the modern monetary system, the money supply is not fixed and is directly related to capital expansions. Nevertheless, for the purpose of grasping a critical connection between the interest rate and production processes, we will use the notion of *ceteris paribus* as long as we only make sensible and meaningful assumptions. Fixed total spending (fixed money supply with unchanged demand for money) is one such assumption.

Hülsmann's approach, which revises Garrison's triangle, portrays a sort of Rothbardian trapezoid (Hülsmann, 2011, p. 25):

Figure 4: Hülsmann's Trapezoid

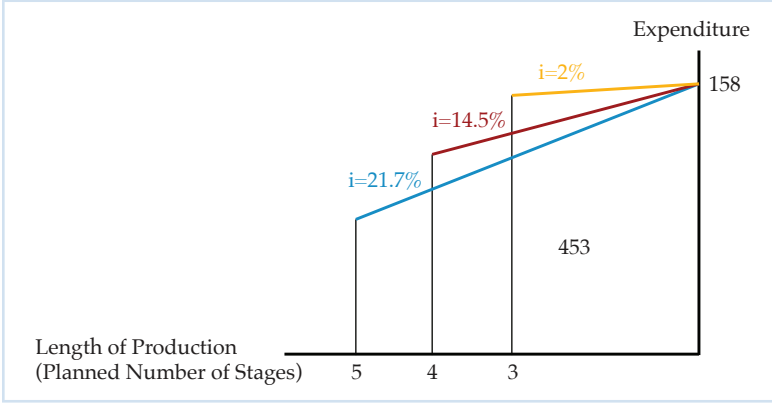


Because of the monetary constraint, the trapezoid formulation can offer us a few insights on shrinking and expanding production structure. The shaded area below the line represents the fixed total

[3] The supply of money is fixed and the demand for money is unchanged, therefore total spending stays the same. The latter does not necessary imply the former. It is theoretically possible that under fixed total spending money supply could for example be increased and the demand for money decreased (so that net effect is fixed spending).

spending. With a decreasing interest rate, the curve has to have a lower slope, since the discounting of consumption has to be lower. The spending in the beginning has to increase. The assumption of fixed total spending leads to another important consequence—less money will be available in the earlier stages. Therefore, with a falling interest rate the production processes have to become shorter, despite what a long Böhm-Bawerkian tradition taught us (for example, Skousen [1990, p. 234]). Fillieule (2007) also reaches this path-breaking conclusion. Various criticisms can be raised against Hülsmann (2011), but in the mathematical form in Fillieule (2007), the argument can hardly be debated. If the money supply remains fixed with unchanged demand for money, a lower discount rate has to sweep out the spending in the earlier part of production and "move" it closer to final consumption.[4] Therefore, inescapably, a lowered interest rate decreases the length of the production process. Hülsmann's paper presents this elegantly (2011, p. 25):

Figure 5: Lower Interest Rate (with Fixed Total Spending) Shortens Production



[4] We skip the mathematical side of the argument. It relies on a geometrical series, where the ratio in the series is the interest rate. The sum of the series is supposed to remain constant (fixed money supply under unchanged demand for money, a sum of all spending). If the spent sum is to remain fixed (money supply), then with a falling ratio (falling interest rate) the number of terms has to be smaller (number of production stages has to be lower, therefore in this framework the production trapezoid is shorter). Even though the mathematical side is beautiful, we will see it lacks important additional considerations. Also, in comparison to Hülsmann, Fillieule pays more attention to other details, as we shall see below.

Fillieule (2007) gives the above presentation a more rigorous mathematical form. Both geometrically and algebraically, under given budget constraints there seems to be no escaping the conclusion that lowered interest rates increase the value of the discounted product and therefore increase the volume of spending in the stages closer to consumption. Hence, because more money is spent in a stage closer to consumption, less money is available at the earlier stages. This conclusion is far-reaching and may surprise Austrians. Higher interest rates increase the length of production; lowered interest rates decrease it.

This argument is a textbook illustration of both the advantages and disadvantages of mathematical economics. On the one hand, there is beauty in the elegance of both algebraic and geometrical exhibitions of the structure of production. On the other hand, as is often the case with mathematics in economics, there is a critical hidden assumption. Yet the assumption seems to be highly debatable. The assumption is that in all stages of production there is the same proportion of labor employed to capital expenditures (in monetary terms). In other words, to use the Marxian term, the "organic composition of capital" is the same in all stages.

Interestingly, Marx used implicitly fixed labor intensity to "prove" the labor theory of value or to demonstrate that under that condition prices seem to respond to labor efforts in each production process. But the truth was that the assumption of fixed composition made this case look as if labor hours determined prices. In similar manner, both Hülsmann and Fillieule assume fixed labor intensity to demonstrate that lower (higher) interest rates lead to shorter (longer) processes of production. As we will see below, it is their assumption of fixed organic composition of capital that causes shortening of the production process, with lower interest rates being only a supplementary, and not necessary, condition.

Before we move on to the importance of labor intensity for the length of production, let us briefly note that Hülsmann does not pay attention to labor intensity at each stage of production, whereas Fillieule assumes it to be the same through the whole structure. (Actually Hülsmann appears to imply that all labor expenditures are made only in the beginning of the production structure.) As Fillieule states (2007, p. 207): "the ratio a of originary factors to investment at each stage (by definition of a proportional structure) is the same in all stages."

2. CHANGES IN THE INTEREST RATE WITHOUT CHANGES IN TOTAL CONSUMPTION?

One immediate criticism, which can be raised against Hülsmann is that his trapezoid extension is given without a necessary decrease in total consumption. Similarly Fillieule (2007, p. 202) with his algebraic demonstrations presented a perfectly sensible equation in which with an unchanged consumption/savings ratio, lower interest shortens the production structure. The immediate counterargument could therefore be: for the interest to fall, total consumption has to fall, and therefore total savings have to increase.

There are two counterpoints to be made at this stage. Firstly, to defend the framework: even if consumption has to fall in the trapezoid so that more savings are lengthening the structure, the final net result—longer or shorter processes of production—would be the question of *interest rate elasticity to changes in the consumption/savings ratio*. Increases in savings (decreases in consumption) would surely make the production structure longer. Nevertheless, once they exercise their influence in this way, the next question arises: how does a decrease in the interest rate affect the structure additionally (apart from the influence of lower consumption and higher savings)? Does it make it even longer if interest falls significantly? Simple comparative analysis of the scenarios shows that the further the interest is decreased, the more it counteracts the effects of increased savings, *ergo* counterfactually decreases the length of production (or, in the framework, the net effect manifested by shorter processes is quite possible). Provided the elasticity of interest is high enough, it can easily counteract the structure sufficiently to make it shorter.

Secondly, and more importantly, one can imagine decreases in the interest rate *without decreases in total consumption*. Yes, it is possible in the Rothbardian framework (as Figures 6 and 7 below illustrate). In Rothbard's trapezoid, the interest can, for example, be cut in half and total consumption could stay the same. What has to increase is total savings. How can, then total savings increase without total consumption going down? Imagine a simple scenario of capitalists decreasing their consumption by X units (total savings increase). Imagine that this additionally

saved money is being spent only on higher wages. Under the framework—for the purpose of simplicity—workers are being treated as pure consumers, so that wages are fully spent on consumption. Hence a decrease in capitalists' consumption by X units is fully (under such scenario) counterbalanced by an increase in X units of laborers' consumption. At the same time, total savings are increased (because capitalists are saving more), and the interest rate can fall with total consumption unaltered.

We do not plan to argue that such is the usual case for the capitalist system. We actually argue the opposite. Empirically, additional savings by capitalists are not fully consumed by increases in wages, and capitalists are investing their money in capital goods, which extends the structure rather than shortening it. Yet this point cannot be demonstrated in an exclusively mathematical manner.

The general conclusion drawn from those frameworks is that—to use the unfortunate neoclassical terms—with a given amount of total savings, total consumption and a given interest rate, we can draw "multiple equilibria" of production structures (parallel cases were observed in the famous "capital reswitching" debates). Similarly, on paper we can draw many different demand curves acting in a very peculiar and strange manner. Nevertheless we are always left with a question of how well the scheme reflects real world changes. To answer, we must go beyond what graphs and math offer us.

When savings go up, the interest rate falls. Effects on the structure depend on how additional savings are distributed. Below, we offer simple examples about possible scenarios and discuss which are more likely to happen in reality. The only way to fully picture how additional savings work (or may work) is to go to the roots of the Austrian theory of capital, disaggregate total spending, and start with one of Rothbard's most important contributions: his imputation diagram.

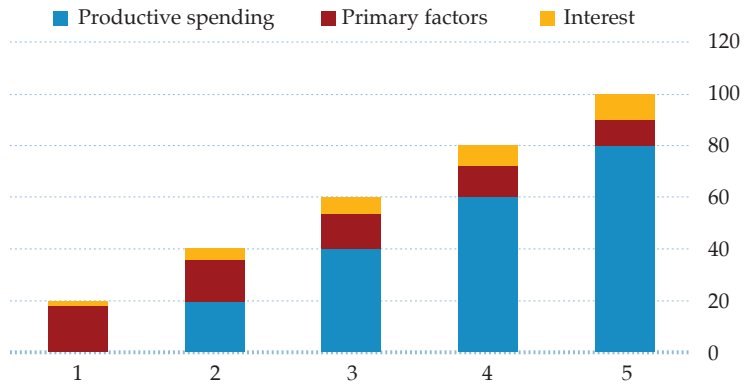
"Where does the saved money go?" is the question not to be omitted in capital debates. Hülsmann assumes that most of it goes to bid for wages in the first stage of production, whereas Fillieule assumes that it is equally distributed between stages of production. The purpose of our paper is to relax those assumptions.

3. A TEXTBOOK EXAMPLE OF THE STRUCTURE OF PRODUCTION

Below, we present a typical textbook example of the production process with specific assumptions. Pure capitalists are owners of money capital. Part of their money is being consumed, while the rest is being spent on investments, including expenditures on labor and capital goods (goods produced by other capitalists). Pure laborers are not saving their income. Instead, they spend it on consumption. After the whole process, monetary holdings are restored. Revenues generated by all money holders' spending return the production structure to the initial position. Let us consider the following example:

Figure 6: Equilibrium Structure

						Sum
Stage of production	1	2	3	4	5	
Productive spending		20	40	60	80	200
Primary factors	18	16	14	12	10	70
Interest	2	4	6	8	10	30
Capitalist budget	20	40	60	80	100	300



The process consists of 5 stages. At the first stage of production, only primary factors are used. The capitalists have 20 units of money. Two units are being spent on consumption; the rest is spent on labor producing capital goods. The value of these goods

consists of frozen time and primary factors, so they are worth 20 units. At the second stage capitalists (owning 40 units) pay 20 units for the capital goods and add 16 units for labor. They also spend 4 units on consumption, which is their interest income (interest incomes are equal to capitalists' consumption because of the equilibrium assumptions of the model). The value of the produced capital goods is 40 units, and capitalists buy the goods in the next stage. They pay additionally for labor 14 units and spend 6 units on consumption. The new, reshaped capital goods are sold for 60 units. (Again, we are in equilibrium, so the initial budget is the same as the budget after all expenditures.)

In the fourth stage the capitalists, apart from paying for capital goods valued at 60, pay for labor worth 12 units and spend 8 on consumption. Capitalists in the last stage pay 80 units for the capital good, so their budget returns to the previous point. In this final consumer stage, capitalists spend 10 units on personal consumption, and 10 units on labor. Spending on labor along with an 80-unit investment in capital goods allows the capitalist to sell final consumer goods for revenues worth 100. The equilibrium is restored.

In general, the total money supply is 300 units; consumption is 100 units. The budget for primary factors is 70 units; capitalists' consumption is 30 units. Productive spending on capital goods is 200 units (a sort of gross investment demand). The interest rate is roughly 11 percent in all stages.

Now, we can raise the question—what will happen if the interest rate falls? There are two true answers to this question. First, it depends on other factors. Second, the way the model is presented, the interest rate cannot really fall by itself. There must be other factors causing the interest rate to go down in the first place. Therefore the answer should be rather that those factors will cause the production structure to respond.

4. LOWERED INTEREST RATES WITH THE SAME, LONGER, AND SHORTER STRUCTURES OF PRODUCTION

How can anything change in the above equilibrium, assuming there is no credit or monetary expansion in the system? Capitalists have

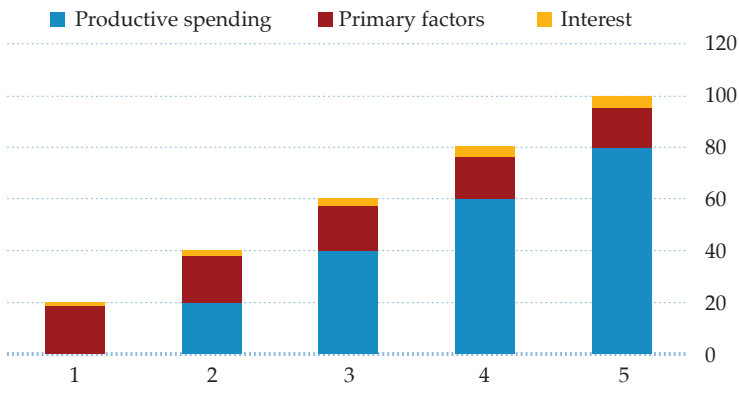
to change their spending (or some laborers have to start to save and thereby become capitalists). The change in the pattern of spending could lead to various changes in the structure of production.

Let us start with capitalists decreasing their consumption and increasing their productive spending. What do they spend additional money on? Is it for capital goods or labor payments? At which stage? The answers to such questions are decisive for the final result. What will happen to the structure of production? Will it become longer, shorter, or the same? The answer is: it can be any of these.

Consider three examples. The structure of production stays the same (still five stages):

Figure 7: Lowered Interest Rate and No Change in the Length of the Structure of Production

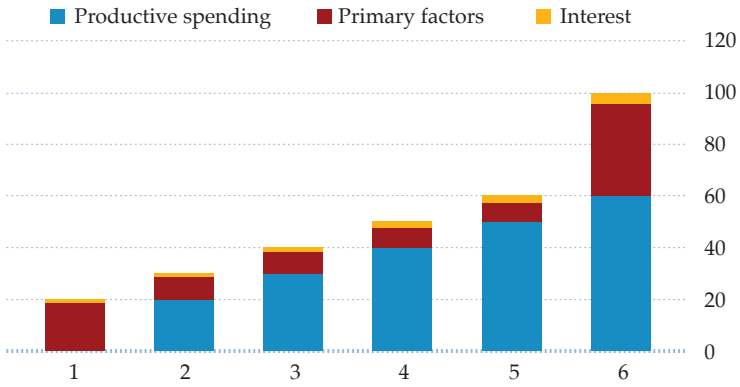
						Sum
Stage of production	1	2	3	4	5	
Productive spending		20	40	60	80	200
Primary factors	19	18	17	16	15	85
Interest	1	2	3	4	5	15
Capitalist budget	20	40	60	80	100	300



The structure of production is becoming longer (additional sixth stage):

Figure 8: Lowered Interest Rate and the Lengthening of Production

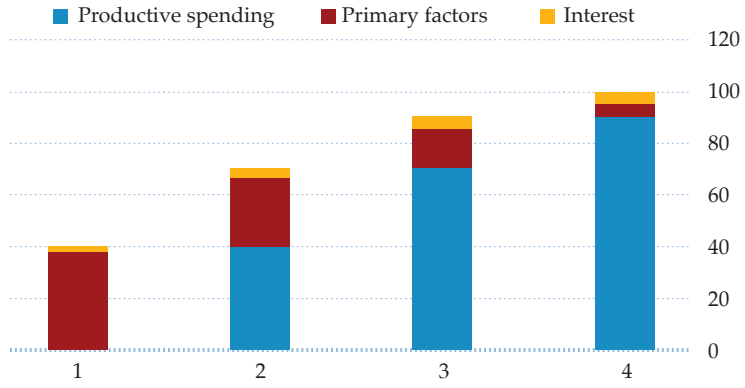
							Sum
Stage of production	1	2	3	4	5	6	
Productive spending		20	30	40	50	60	200
Primary factors	19	8.5	8	7.5	7	35	85
Interest	1	1.5	2	2.5	3	5	15
Capitalist budget	20	30	40	50	60	100	300



The structure of production is becoming shorter (only four stages):

Figure 9: Lowered Interest Rate and the Shortening of the Structure of Production

Stage of production	1	2	3	4	Sum
Productive spending		40	70	90	200
Primary factors	38	26.5	15.5	5	85
Interest	2	3.5	4.5	5	15
Capitalist budget	40	70	90	100	300



In all three cases, the interest rate is lower, roughly 5.26 percent. Yet despite the fact that it is lower, the structure of production may become shorter, longer, or stay the same. It is not the result of consumption staying on the previous level (100 units). We could draw three similar illustrations with both consumption lowered (for example to 90 units) and lowered interest rates. It would still be possible to present longer, shorter, or constant structures of production. The reason for the variety of consequences lies in something other than the interest rate—*the amount of spending on labor at each stage*.

Notice that in the example of the extended process of production (Figure 8), most of the money budgeted for primary factors is spent at the very last stage of production. In the opposite example, with only four stages of production (Figure 9), the budget for

primary factors is mostly consumed in the very early stages of production. In consequence, this is a vital factor for the length of the structure of production—how much money is being spent on labor at each stage. If more of the spending on labor happens closer to consumption, the structure of production is lengthened. If more of the spending on labor is in the earlier stages of production, the structure becomes shorter.

5. INTERTEMPORAL LABOR INTENSITY AND THE SUBSISTENCE FUND

The factor influencing the length of the structure of production discussed in the previous paragraph could be called *intertemporal labor intensity* (ILI). The labor intensity of any production process depends on how much labor is employed. The intertemporal aspect plays a role, because 50 units of labor hired in the first stage will influence length in a completely different manner than 50 units of labor hired in the last stage of production. If relatively more labor is being employed in the earlier stages of production, the length has to shrink. If laborers are moving towards the later stages, the structure becomes longer. What seems also significant for other reasons, this conclusion is inescapable even with growth in technology and extension of knowledge, so we can avoid an uncomfortable *ceteris paribus* assumption for those elements.

The empirical interpretation of the structure of production should go as follows. Capitalists are increasing their savings by reducing consumption. They are spending additional monetary units productively. Therefore the adjustment is necessary. Decisions to bid up wages of laborers versus to add supplementary capital goods (additional stages, together with decisions about when to do it) determine the length of the structure. Various final outcomes of this process are possible in this *purely theoretical framework*. Nevertheless, as an economic fact, though not a praxeological law, capitalists increase their productive spending in order to make production more productive, *ergo* capitalized in the earlier stages—since the purpose of additional investments is to increase productivity through additional capital equipment. As history demonstrates, during the process of development, intertemporal labor intensity decreases, which means relatively less labor is hired

in earlier stages, and more labor is hired closer to consumption in the service sector. As a result, in the development of the world economy, the structure was lengthened (even though consumer goods became more readily available).

A careful reader could see a slight resemblance to Richard Strigl's notion of the subsistence fund (Strigl, 2000, p. 57). Strigl argued that capitalists might be seen as supplying necessary consumption goods for the workers until the processes of releasing those goods are finished. Even though we do not subscribe to Strigl's view, the particular point on capitalists supporting laborers' wages is quite relevant. Higher intertemporal labor intensity means capitalist spending at each consecutive stage works like a larger subsistence fund. Therefore, most of the budgets are used to sustain the laborers at earlier stages, because their income is being capitalized at each consecutive stage. With longer processes and more stages, more of the limited money supply is used to capitalize those wages.

If ILI is decreased, which is equivalent to more labor (in monetary terms) being hired at later stages, capitalist spending supports production of capital goods, rather than supporting workers in the earlier stages. Empirical studies of growing economies clearly indicate that. After all, in most developed economies the workers are placed largely in the very last stages of the production structure in the service sector. Therefore most of the capitalist spending in the earlier stages is used to support increased capital investment, which on the one hand increases productivity (and wages) of (the fewer) workers in the earlier stages, and on the other hand allows the rest of the workers, in later stages (mostly in the service sector), to reap the benefits of a more productive economy (which is characterized by the lengthened structure of production).

With a fixed money supply and unchanged demand for money (in equilibrium), capitalists have limited choices about where to spend their money. Each unit spent on a particular factor of production reduces the opportunity to spend it elsewhere. If capitalists employ laborers in the very earliest stage of production, each consecutive capitalist indirectly supports those laborers' wages (and consumption), because those wages are capitalized in the subsequent stages. (In a sense, they are counted in the capital value of complementary goods.) At each stage those goods have a certain value that has to be paid for, which in turn consumes a

larger part of the existing and limited money supply. Therefore the notion of intertemporal labor intensity is important for explaining how interest rates, savings, and consumption influence possible structures of production. Without this notion it is impossible to decide whether a lowered interest rate leads to shortening or lengthening of the structure.

Henceforth in Hülsmann's illustration, an assumption of all labor hired in the first stage makes the structure always shorter with lowered interest. But it is precisely this assumption which shortens the production—not just the interest rate. How feasible is such scenario? How likely is it that capitalists use additional savings to employ most of the labor at the earlier stages? Empirically it is highly unlikely, though not unimaginable. It would have to mean some spontaneous development of new skills of laborers (probably a combination of human capital and technology), who can become more productive in the earlier stages while using smaller amounts of capital equipment than previously.[5]

The notion of intertemporal labor intensity in the environment of fixed total spending can also shed some light on the normative aspect of the "reswitching debate" over whether capitalist profits (related to interest) are a reward for waiting. The mathematical proof that interest has no relation to lengthening was seen as a basis for the argument that economic considerations cannot justify capitalist profits. As Samuelson (1966, p. 568) put it:

> The simple tale told by Jevons, Böhm-Bawerk, Wicksell, and other neoclassical writers—alleging that, as the interest rate falls in consequence of abstention from present consumption in favor of future, technology must become in some sense more "roundabout," more "mechanized," and "more productive"—cannot be universally valid.

The "simple tale" in fact has to be modified by Striglian considerations: total productive expenditures (whole investment budgets)

[5] In one of his lectures Professor Salerno gives this kind of fictional and extreme example. If people discover that without building nets for fishing their singing of Beatles songs causes the fish to jump out of the river, then the production will become shorter for human capital reasons. An example does illustrate how capitalists would be ready to bid for wages of laborers in the earlier stages at the expense of investments in the capital goods.

and intertemporal labor intensity. We generally have reservations about possibility of mixing positive and normative aspects, yet in the case of more intertemporally labor-intensive processes capitalists gain profits for financing laborers in the earlier stages, whereas in the case of less intertemporally labor-intensive processes they gain their profits for financing capital widening. The former case supports more consumption-oriented systems, whereas the latter supports more growth-oriented economic systems. In either case, capitalist profits are associated with either more current wage-support, or more economic growth (more remote wage support).

As we see, then, the length of the production process is linked with intertemporal labor intensity, not just the savings rate and the rate of interest, although those last two factors come into play through allocating labor. The influence of savings on length is bounded by two factors: how much of those savings finance workers' wages (and therefore consumption), and most importantly, where in the production process those wages are financed (whether more or less remote from consumption). Higher savings certainly allow for financing additional stages of production and can make the structure longer. Yet this influence cannot be properly scrutinized without reference to intertemporal labor employment, because with changes in ILI, production can become significantly longer or shorter even without changes in savings (or with changes in opposing directions).

We are not assuming that a decision how much to spend on labor at each stage—or how great intertemporal labor intensity is—is a completely arbitrary decision made by the capitalists. Capitalists are motivated by returns on their capital, henceforth their choice is aimed at choosing those methods of production which allow for higher returns. The successful route for bigger profits lies in the increases in productivity, which can be realized at most times by the investments in more capital equipment. Increases in real productivity, however, cannot be depicted in either of the presentations, because the framework is purely nominal.

The Rothbardian trapezoid/triangle approach could be seen as an additional example of how limiting a mathematical and graphical illustration can be. We cannot imply anything *logically* from such framework on how the lowered interest *has to* cause an increase (or decrease) in the length of production, since

mathematically (and logically) it can go either way. In order to make the framework sensible and reflective of reality, one should resort to the general empirical notion that higher productivity is reached by investments in capital goods.

6. THE ASSUMPTION OF FIXED ORGANIC COMPOSITION OF CAPITAL

Renaud Fillieule (2007) assumes explicitly that production is "proportional"—the relation of labor to capital is the same in all stages. Under this assumption, a lowered interest rate has to shorten the structure of production. Yet it is the proportionality assumption that leads to a shortening of production. To see this, compare Figures 6 and 9. A move from Figure 6 to diagram 9 represents capitalists decreasing their consumption and spending more money on production. The decision was to increase spending on wages, but the pool of additionally saved income was not distributed proportionally between the stages. More of it has been devoted to earlier stages of production; therefore the structure of production had to become shorter. Yet even if we assume the proportion between capital and labor always stays the same, with decreases of the interest rate the length of the structure has to shorten (as Fillieule has proven).

Is this correct theorizing about where the additional money goes? We should try using the notion of *ceteris paribus*. Here is where capital considerations get tricky—it is nonsensical to assume that nothing is changing, because additional causes have to lead us to some results differing from the initial equilibrium. The issue is: which things should we allow to change in the model? We can choose Fillieule's way and assume the organic composition of capital has to stay the same, but this means assuming that (1) capitalists are more eager to bid for labor in the earlier production processes; (2) the structure of production has to shrink; (3) technological adjustments must happen (reduction towards a less-capital-intensive economy—would capitalists actually prefer such an investment adjustment?); and (4) production has to become more consumption oriented, because a bigger part of the budget will be spent supporting wage earners' consumption. On the other hand, we could choose the *ceteris paribus* assumption

about intertemporal labor intensity, so that additional savings lead to disproportional bidding for laborers at each stage (the organic composition of capital is disproportionate), huge technological changes are not happening, the number of stages stays the same, and capital widening is not reversed, but sustained as is. Why should this choice be seen as less in the spirit of equilibrium than the previous one?

Any assumption can be used in pure theorizing, including the fixed organic composition of capital. However, nothing in this particular assumption would make it more compatible with the equilibrium state. Under equilibrium, or the evenly rotating economy, the organic composition of capital can differ between stages (and in reality it of course does differ). Equilibrium is characterized by lack of profits and losses and by equilibrated structure. Profits and losses can be arbitraged away, no matter how the proportion of labor expenditures to capital expenditures varies. Why should we assume that the organic composition of capital has to stay constant and not that intertemporal labor intensity should stay constant? The choice of fixed proportions in each process between capital and labor seems to be more in the spirit of neoclassical economics, where usually one global production function is used for depicting proportions of capital to labor.[6]

Putting the equilibrium issue aside, as we mentioned, the empirical content in any theory is also important. Historically, higher savings at lowered interest rates are mostly used for building capital goods. A firm can employ more capital to dominate the earlier stages of production, whereas it employs the labor force in the later stages of production. That is why, in reality, lowered long-term interest rates are most often associated with lengthening of the structure of production—because, empirically, with higher savings and lowered interest rates, the intertemporal labor intensity steadily decreases, so that a firm builds up capital for more production rather than workers' consumption.[7]

[6] Filieule points to Hayek (1941, p. 124), who argued that it is reasonable to use the notion of fixed organic composition of capital. Nevertheless Hayek did that to simplify neoclassical considerations in order to shape an input curve into the form of an exponential curve.

[7] There is one additional benefit of the analysis. "Technological changes" cannot be separated from changes in the capital structure, as the Austrians always argued.

CONCLUSIONS

Does a lower interest rate lead to an increase in the length of the structure of production? The universal strict answer is indeterminate. Other factors are in play.

Fillieule and Hülsmann's works are milestones in the recent development of capital theory. They open the field for new explorations. Our goal is to point to one key factor that they set aside—intertemporal labor intensity—that changes their conclusion that there is an inverse relation between interest rates and the length of production.

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Technology can only be advanced by real capital extensions, and also the other way around: it is impossible to imagine capital extensions without changes in technological features of the production structure. Therefore, in capital theorizing, technological changes and additions of capital goods have to go hand in hand.

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Praxeology Of Coercion: Catallactics vs. Cratics

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ABSTRACT: Ludwig von Mises's most important legacy is the foundation and analysis of catallactics, i.e. the economics of interpersonal exchange, as a sub-discipline of praxeology, the science of human action. In this paper, based both on Mises's methodical framework and on insights by Tadeusz Kotarbinski and Max Weber, a "praxeology of coercion," or, more precisely, an analysis of interpersonal actions involving threats, is developed. Our investigation yields both a reviewed taxonomy of human action and a first analysis of the elements of this theory, which we term *cratics*. This shall establish the basis for adjacent studies, furthering Mises's project regarding the science of human action.

KEYWORDS: Austrian school, praxeology, catallactics, coercion

JEL CLASSIFICATION: B53

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INTRODUCTION

The Austrian economist Ludwig von Mises intended to re-establish economics on a deductive basis, with the subjective valuations, expectations, and goals of acting humans at the center, following the tradition of the "Austrian School" (see Mises, 1940 and 1962). He interpreted economics as a branch of the broader study of human action, which he named *praxeology*. Nonetheless, most of his praxeological analyses focused on *catallactics*, i.e. the economics of interpersonal exchange, which lies within the established boundaries of economics. Mises himself wrote, "Up to now, the only part of praxeology that has been developed into a scientific system is economics" (Mises, 1962, p. 42). He thereby implied that a furthering of praxeology into the study of non-economic, precisely: non-catallactic, actions would be necessary and desirable.

Following the cited sentence, he pointed to the Polish philosopher Tadeusz Kotarbinski, who intended to develop a praxeology of conflicts, however, with a differing understanding of "praxeology" and of the required scientific approach. In his "general theory of conflict," an important precursor to modern game theory, Kotarbinski identified humans' differing subjective goals as the origin of potential conflict. Namely, "subject *A* finds himself in conflict (or competition) with subject *B*, if (1) *A* aims at a certain state of affairs, while *B* aims at a state of affairs differing from this one, whereby these targeted states of affairs cannot be reconciled; and (2) *A* and *B* are aware of this, therefore both making an effort to adjust their own actions to the other party´s (intended) actions. In short: *A* and *B* find themselves in conflict (or competition) with one another when they seek contradicting objectives, and they both anticipate the other party´s actions." (Kotarbinski, 1938, p. 68, own translation). With his analysis remaining on this quite general level, however, he does not go on to analyze the resolution of such contradicting objectives. This leads to an untenable equalization of peaceful and constructive actions (such as card games, barter deals, or economic competition in general) with destructive actions (such as warfare). Kotarbinski merely contrasts "positive" and "negative cooperation." The former refers to *shared* goals (he gives the example of an orchestra), the latter to *conflicting* goals (he gives the example of a duel). For human interaction with contradicting

objectives, he suggests the term "agonistic," naming the chess player and philosopher Emanuel Lasker as the originator of this "theory of conflict" (Kotarbinski, 1970, p. 321). This is surprising, since the discipline of economics precisely shows how the resolution of conflicting objectives can form the core of peaceful coexistence and society. Nonetheless, what Kotarbinski rightly points out is the fact that conflicting objectives can definitely be resolved in a different way, namely, involving violence.

Acknowledging that non-catallactic interpersonal actions play an important role, Murray Rothbard defined praxeology as a general formal theory of human action and divided it as follows (Rothbard, 1951, pp. 945–946):

1. The Theory of the Isolated Individual ("Crusoe Economics")
2. The Theory of Voluntary Interpersonal Exchange (Catallactics, or the Economics of the Market)
3. The Theory of War (Hostile Action)
4. The Theory of Games
5. Unknown

As we understand them, both Mises and Rothbard explicitly invite their readers to perform further analyses in this area—an invitation that we are delighted to accept. With these important works towards a "praxeology of coercion" in mind, our present work pursues two objectives:

a) To review the taxonomy of human action, thereby specifying the definition of a "praxeology of coercion", and

b) To investigate basic elements of such a theory, drawing on analogies to catallactics.

TOWARDS A REVIEWED TAXONOMY OF HUMAN ACTION

According to the well-established definition, human action—in the sense of an active, initiating, consciously chosen action—requires the mental vision of an alternative condition of the world, which the acting subject prefers over the current condition. As the human mind can envision a large set of alternative conditions, the

subject's preference includes a choice. While the theoretical investigation of natural processes, including physiological processes of the human organism, enables a coarse classification of human preferences, it cannot achieve their deterministic forecasting. The human as an acting subject is capable of choosing against his nature and his physiological needs. This is a necessary side effect of the unique human ability to contemplate the world and to choose. Moreover, due to uncertainty about the consequences of actions and the dynamics of the world, conditions can unfold that do not match the initial vision, such that the subject might, *ex post*, even prefer the initial situation. Hence, continual analysis of the changing situation and continual action are required in order to reach a preferred condition.

Following these introductory remarks, let us specify a set of constituting elements of human action. Carl Menger (1871, pp. 2–3) defined four such constituting requirements for goods, i.e. for a certain category of actions or things: a human need or objective, the capability of the action or thing to fulfill the objective, knowledge of this capability, and the availability of the action or thing. In analogy to Carl Menger, we state: That every human action is based 1) on the realization that a condition of the world is possible which the subject prefers over the condition that is expected without his acting (purpose); 2) on the assumption of a possibility to causally bring about this condition through action (means); 3) on the factual capability to perform this action.

Starting from this definition, we can now introduce our reviewed taxonomy of human action.[1] Herein, we follow the classification implicit to the structure of academic disciplines. Namely, at the lowest level, we distinguish between *social action*, a constituting element of social science, and non-social, or, interpreting Mises,[2] *autistic action* (Mises, 1940, p. 180), which the psychological discipline investigates: According to Max Weber, humans can vary their actions according to social contexts and how they will affect

[1] Such a taxonomy, modeling a complex real world of human action, benefits from a certain level of simplification. In particular, we abstain from considering "hybrid" actions, i.e. those actions that are comprised of two or more "sub-actions"—which might fall into different categories.

[2] We will come back to Mises's classification in more detail at the end of this section.

other people; whenever they do, they act socially (Weber, [1922] 2006)[3]. This very basic insight—that either human action can be social or non-social—has only rarely been questioned.

In specifying it, we can employ elements of our above definition: A human performing a social action can consider the other person[4] as either a purpose or a means.[5] This directly brings about our second bifurcation: A social action with the other person as the purpose always constitutes a *unilateral action*, more precisely, a *unilateral benefit or harm*. Herein, *unilateral* refers to the relationship between actor and acted-upon, rather than excluding the possibility that the acted-upon may very well react as a consequence.[6]

For those social actions where the actor considers the other person as a means, we need to take into account the important fact that this other person himself is a potential actor. Indeed, not only the other person's inactive body and belongings, but also his actions, can serve as a means of one´s own action (Menger, 1871, p. 7): In particular, those actions by other subjects (external actions), which are perceived as relevant to achieve one´s own purposes, are useful, scarce, and therefore valuable. For the case where the actor intends the other person to act, we consequently suggest the term "*bilateral* (*social*) *action*."[7] In order to make him act, the actor[8] needs

[3] While we follow Weber's basic distinction, we would like to deviate from his further classification of social action, which focuses on the actor's rationality and contemplation – an investigation we believe belongs to the psychological, rather than the social, discipline.

[4] Or persons, but for the sake of simplicity let us move forward with the singular.

[5] Or both—a hybrid case, which, again for simplicity reasons, we shall neglect.

[6] The latter case, iterative action, can easily be dissected into a sequence of single actions. In this work, we have only considered single actions, either bilateral or unilateral, as opposed to sequences of actions. A bilateral action differs from a two-step "loose sequence of actions" precisely therein that *ex ante* the mutual behavior was promised (by the initiator), and accepted or rejected (by the counterparty). In effect, a sequence of actions is possible, in which the actors have coordinated their future behavior (implicitly or explicitly). On the contrary, in iterative actions, we face the unpredictability of free will—in every step of the sequence, one can choose from a multitude of alternatives, without breaking one's word. Iterative actions should therefore not be part of a basic taxonomy of individual actions, for which we are striving here.

[7] Or, *multilateral social action* for the case where more than one person is addressed.

[8] Or initial actor, or initiator.

to influence the other person. This influencing taking part *ex ante* the actual action, we speak of a *promise regarding the ensuing action*.[9]

On the other hand, the actor might intend the other person to remain inactive vis-à-vis his action, and rather utilize the other's property to attain his purpose. Such utilization amounts to an expropriation, or, prosaically, a transfer. We therefore propose the term of "*unilateral transfer*" for this domain of actions.

These two domains of actions, *bilateral actions* and *unilateral transfers*, are the most important domains for our present-day societies that employ a wide-ranging division of labor. They can very well occur among complete strangers,[10] whereas *unilateral benefit or harm* typically only occurs among persons "who mean a lot to each other," either in the positive or negative sense, restricting the range of such actions significantly.

Now, we need to take one final step, recognizing that a bilateral action can either be symmetric in the sense that the initiator meets the other person at eye level, allowing the latter to reject the former's initiative without having to suffer any damage, or more broadly, without having to incur any costs. In this case, the promise regarding the ensuing action is, more precisely, an *offer*. Or, alternatively, that the actor can deny him that option, revealing that he evaluates the other person's dignity as inferior to his own (asymmetric dignity), with the promise being specified as a *threat*. The philosopher Hillel Steiner points out, importantly, that the distinction between offers and threats presupposes a *norm*, which amounts to the status ex ante the action—or, in his terms, intervention (Steiner, 1974).[11] Namely, without such a norm, we cannot

[9] It is important to notice that we do not employ the term "promise" in its moral sense. A neutral phrase, such as "prediction regarding the actor's ensuing action," would avoid this ambiguity, however, would complicate further reading. And the term "prediction" itself, in turn, lacks the essential element of the actor predicting his or her own actions.

[10] In many cases, strangers are humans that are not part of our order of preferences, i.e. their well-being does not constitute a purpose in itself, from our perspective. Of course, there are (religious) beliefs that promote all strangers as brothers and their well-being as a purpose in itself, such as the Christian, however, their practical impact is usually limited.

[11] In his considerations, Steiner correctly distinguishes threats and offers by *desirability*. However, we consider his central remark that a threat does not constitute

judge whether the action imposes costs on the counterparty. Human actions that start with offers that can be rejected free of cost[12] by the counterparty belong, according to F.A. Hayek, to the area of catallaxy (Hayek, 1969, p. 112); the study of this area according to Richard Whately and Ludwig von Mises (1940, p. 3) being termed catallactics.

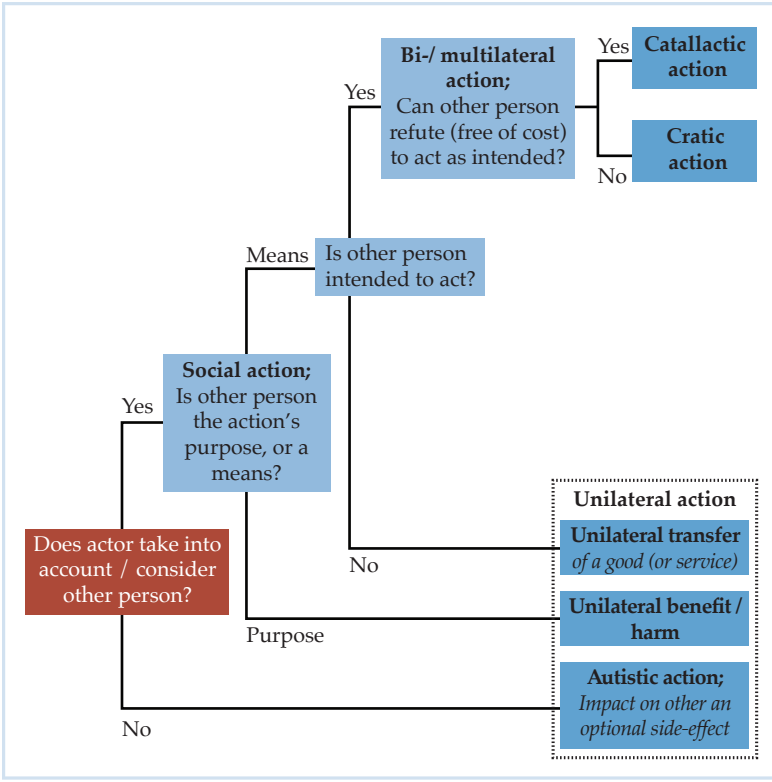
On the other hand, the area of actions based on threats has not yet been named, to our knowledge, in unambiguous terms. We choose the term of *cratics*—from the Greek *kratein*, which approximately means, "to rule violently."[13] Figure 1 visualizes the resulting taxonomy.

a reduction in *individual liberty* as secondary. Or, to be more precise, our concept of *liberty* is fundamentally different from Steiner's, reconciling (relative) *liberty* with (relative) *absence of threats*. But the present consideration does not endeavor to do justice to this comprehensive topic, primarily for the reason that we believe a discussion of *liberty*, due to its connotations, falls into the discipline of *ethics*—an area that we envisage to cover in future works, as outlined in the last chapter.

[12] In the following, for the sake of simplicity, we might neglect the element "free of cost" and simply speak of offers that can—or cannot—be rejected.

[13] This is not an unconsidered choice; a couple of terms lend themselves for this task, such as Kotarbinski's term *agonistics*, or *theory of violence* / *coercion* / *force*. There are three reasons not to employ Kotarbinski's term *agonistics*: Firstly, this term has already been employed in 1979 by Jean-François Lyotard in a completely different context (Lyotard, 1979, p. 99). While Kotarbinski has largely been forgotten, Lyotard is quite present as a famous philosopher of "postmodernism." Secondly, Kotarbinski's term includes a distinction based on interpretable motives and therefore assumes knowledge of the actor's psychology. Thirdly, and most importantly, Kotarbinski's term mixes two disparate categories of action. The situation of two humans promising a utility increase to a third human fundamentally differs from the endeavor to destroy another human. Focusing on the similarities of these types of competition leads to untenable ethical implications. On the other hand, both *violence* and *force* carry unnecessary physical connotations. Finally, even *coercion*—our second-best candidate—suffers from sometimes unspecific use in "everyday-language."

Figure 1: Taxonomy of human action

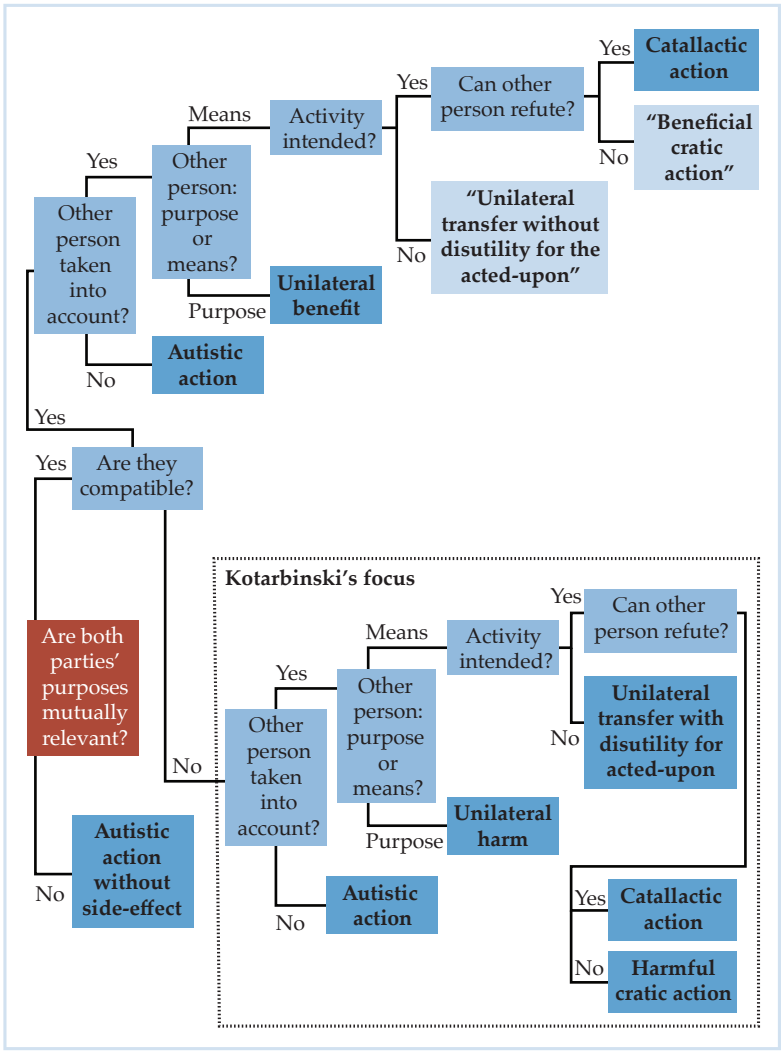


In summary, the first bifurcation accounts for differing academic approaches, the second one distinguishes between the core elements of the definition of human action, the third one takes into account a person's unique characteristics, and the fourth one introduces the question of symmetry between the involved persons. Obviously, further distinctions are possible (e.g., beneficial vs. harmful unilateral actions, etc.)—from which we abstain, having crystallized our field of interest.

For illustration, in the following, we will try to reconcile this classification with the above-mentioned philosophers' approaches. Kotarbinski's "conflicting objectives" or, in other words, "incompatible purposes," shall be the first candidate. In contrast to our focus on the actor, his approach presupposes (at least) two acting

persons, which requires us to add an additional step in our classification tree, as shown in the resulting Figure 2.[14]

Figure 2: Reconciliation with Kotarbinski's approach



[14] For completeness, we have put in front the additional question whether the parties' purposes have any mutual relevance at all.

The chart indicates both our concept's applicability to other approaches, and how the question of "purpose compatibility" alters the quality of the resulting alternative types of action (e.g., unilateral benefit vs. harm)—in all the cases apart from catallactic action. This, once more, points to the beneficial power of catallaxy: Greek *katallasso* doesn't only mean "to exchange," "trade," but also "to be accepted into a community" and "to turn a foe into a friend." On the other hand, "violent rule" is the exact opposite, a form of action with all the potential to turn a friend into a foe, and to undermine a community. We´ll come back to this mirror-inverted analogy between the two forms of bilateral social action.

A remark regarding the "*beneficial cratic action*" is required: In fact, the promise of a condition of the world that one can only avoid via a non-preferred action, could very well bring forth an objectively better situation for the recipient. However, praxeology strives for definitions that are correct for all humans, without assuming any specific individual preference system. Both realism and humility urge us to trust the subjective judgment of the person receiving the offer. If he cannot reject the offer without incurring costs (Your money or your life?—Thank you, but I do not wish to lose either one!), we can confidently assume that such an "offer" does not intend any creation of counterparty utility. Which, in turn, exposes the category of "*beneficial cratic actions*" as a praxeologically irrelevant exceptional case.[15]

Taking our leave of Tadeusz Kotarbinski, let us travel on to Murray Rothbard. His first category relates to autistic action with no side effect, the second one is catallactic action. War, if following a (sequence of mutual) threat(s), falls into the category of cratic action—but might, at least in theory and propaganda, also result from a purely unilateral attack, i.e. harm. Games typically exhibit iterative human action, where each step amounts to a bilateral social action.[16]

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[15] This assessment also applies to the case of the "*unilateral transfer without disutility on the part of the acted-upon*."

[16] From our perspective, both the concepts "war" and "game" have been employed in quite broad terms, impeding their unequivocal classification—of course, a common problem of social science.

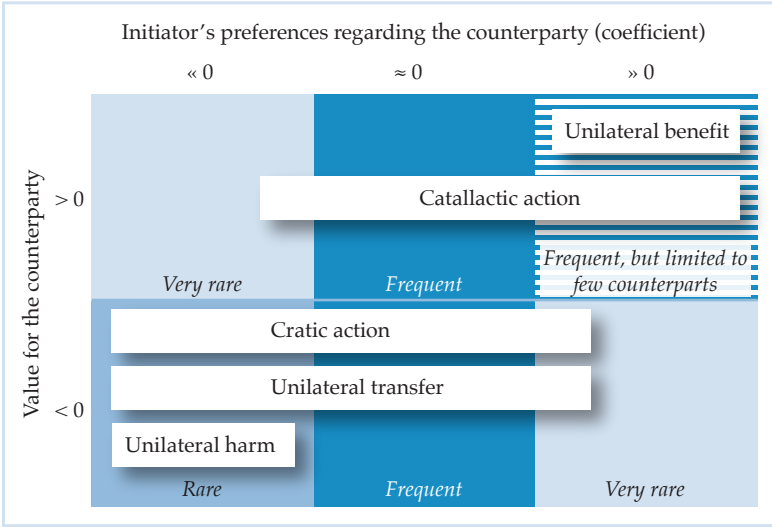
The third illustration refers to the term of "autistic exchange" as introduced by Ludwig von Mises (Mises, 1940, p. 180). He differentiated this from interpersonal exchange (or action) in the following way: "Where there is no intentional mutuality, where an action is performed without any design of being benefited by a concomitant action of other men, there is no interpersonal exchange, but autistic exchange. […] In the same way, the boundaries between autistic exchange and interpersonal exchange are sharply distinct. Making one-sided gifts without the aim of being rewarded by any conduct on the part of the receiver or of third persons is autistic exchange. The donor acquires the satisfaction, which the better condition of the receiver gives to him. The receiver gets the present as a God-sent gift. But if presents are given in order to influence some people's conduct, they are no longer one-sided, but a variety of interpersonal exchange between the donor and the man whose conduct they are designed to influence." (Mises, [1949] 1963, pp. 229–230) In conclusion, Mises's "autistic exchange" can be reconciled with our "unilateral action."[17]

The fourth—and final—illustration ties in with the above notion that bilateral action and unilateral transfer are of foremost importance since they can systematically occur among persons who are indifferent vis-à-vis each other. Re-formulating, these are persons regarding whom we have no or negligible *other-regarding preferences*.[18] Coming from a different angle, our taxonomy can also serve to distinguish actions according to their counterparty impact (marginal utility/value). Employing ORPs and counterparty value as orthogonal dimensions yields a framework into which we can map our social action categories (Figure 3). For the benefit of conciseness, we refrain from further explanations and let the chart speak for itself:

[17] "Autistic" being an adjective with mainly psychological/psychopathological connotations, we prefer "unilateral" for reasons of precision.

[18] We argue that a major share of inter-human relationships fall into this category. In particular, humans we do not know in person, i.e., the vast majority of all humans, are typically not represented specifically in our preference system, since we have no concept of their individual preferences.

Figure 3: Social action categories in ORP-vs-counterparty-value framework, including estimates of interaction frequency



Further illustrations promise to yield further insight. In the last section of this paper, we point to potentially attractive investigative lines of attack. However, at this point, we prefer starting to build the framework for the newly specified scientific field of cratics.

BASIC ELEMENTS OF CRATICS—ANALOGIES TO CATALLACTICS

A newborn child looks up to his elder sibling with love and admiration, intending to learn as much as possible in, seemingly, very scarce time. In much the same fashion, we intend to bring up our infant science of cratics, letting her benefit from her superiorly situated sister, catallactics.

We already identified an inverted-mirror analogy between the two. In the following, as a starting point for our framework, we will expand on these analogies.

1) Catallactic *offers* promise actions or goods, which might induce an increase or decrease in *utility* for the recipient. Since humans are diverse, these actions and goods cannot be

generalized—for one likes and finds useful what the other does not. We tend, through our actions, to avoid displeasing conditions of the world. Since we can avoid "rejectable" offers, their marginal utility is greater than or equal to zero, but never negative. "Non-rejectable" offers, however, include the *threat* of a *marginal disutility*—i.e., a reduction of utility. The actions of other human beings can either be influenced through the promise of marginal utility or the threat of marginal disutility. No real-life society is completely free from cratic actions, as they constantly compete with catallactic actions for being chosen by the initiators of bilateral social actions.

2) Mirroring the catallactic *good*, an action or object that causes marginal disutility can be called a *bad*. In an analogy to Menger's above-mentioned definition of goods (Menger, 1871, pp. 2–3), an action or thing constitutes a *bad* to a person when: 1) A condition of the world with reduced utility for the person is conceivable; 2) the action or thing can actually bring about that condition, i.e. impose an expected marginal disutility on the person, 3) the person realizes this, and 4) someone actually has the bad at their disposal or is able to perform the respective action.

3) Obviously, a promise can only constitute an *ex ante* prospect of a utility or disutility. Due to the uncertainty of the future, our actions are always based on estimations. *Ex post*—after the interaction—expectations of utility and disutility can turn out to have been unfounded. In general, an interaction will not be regretted in retrospect when the subjective value lies above the cost, viz. when the realized marginal utility outweighs the expended costs. In this case, the condition of the world after the interaction is preferred over the condition of the world before the interaction. We can then say that the *offer* was *backed*. Knowingly making promises that are *unbacked* is a *bluff* (and is usually considered fraud).

Just as catallactic promises can turn out to be unbacked, so can cratic promises or threats. We identify a *threat* as *backed* when the realized marginal disutility lies above the "price," i.e. the costs that the threatening party intends the threatened party to accept (the "money" in "your money or your life"). Revealing that a threat is not (fully) backed is equivalent to

showing that the threatening party is not capable or willing to cause a harm that is greater than the price requested for refraining from the harm's execution. If the promise "your money or your life" is lacking the capability and will to take the life of the victim, it is *unbacked* or, at most, *partly backed* (if a greater damage can be inflicted than the loss of the money). So the victim possibly makes a choice that makes him worse off, namely to give up more than would be justified in the light of the potential harm (which in this example might amount to continual psychic pressure, possibly due to vigorous gesticulation with the loaded gun). Again, such a threat is a *bluff*.

Subjective expectations are the decisive cause of action, both in the areas of catallactics and cratics. Consequently, the evaluation of the capability and willingness to comply with a cratic promise is core regarding the further development of the interaction. Void threats that lack any capability can be equally successful, in terms of their potential to influence actions, as void promises to ultimately worthless goods.

4) Let us note a specific but relevant difference: An *insufficient backing* of catallactic *offers* remains *unrevealed when rejected*; and only in the case of acceptance, i.e. in a truly reciprocal action, the counterpart can directly realize the insufficient backing of the promise of utility (i.e. insufficient liquid wealth on the initiator's part). However, an *insufficient backing* of cratic *threats* is *revealed when rejected*. Only if the other party accepts the "offer," i.e., acts according to the terms of the threatening party (e.g. gives money in order to save his life), then the threat remains untested.

5) The ability to give backed catallactic promises can be called *wealth*. In a society with a division of labor, most catallactic interactions are performed involving a generally accepted ("liquid") medium of value and exchange: money. It also serves as a standard in estimating the opportunity costs of exchanges. Money is not only a medium for promises of value but is itself a promise of value. The purchasing power of money depends on the valuation of its quality. Quality in relation to money primarily means *liquidity*, viz. the ability to exchange it for other goods or actions at any desired point in time and in any desired quantity.

In naming the ability to give backed promises of disutility, we need look no further than to the term *power*—the mirror-inverted analogy to wealth. According to Max Weber, power denotes the expected capability to establish conditions of the world against the will of other humans (Weber, [1922] 2006, ch.1, § 16). As with wealth and money, the quality of power is determined by the degree to which it is backed. Unbacked power, lacking the capability or will of enforcement, will collapse once it is uncovered ("The emperor has no clothes!"). In general, power exhibits a greater backing when its utilization is more "liquid," meaning the more it can be enforced at any point in time and against any number of people. E.g., *highly illiquid* power would rely on the physical strength of a single person, but would not be used in threatening a large number of individuals. As long as it is challenged only by a single and weaker individual, it can be maintained, however, as soon as a larger number of threats are "uncovered" (their "backing" being tested), the power will be untenable.

We herewith conclude the introduction to elements of cratic action, explicitly inviting the reader to further investigations. In the following, we lay out a program for areas we consider of high importance and fertility.

OUTLOOK—FURTHERING THE SCIENCE OF CRATICS

Based on this first illustration of cratics, many applications are possible, promising a better understanding of violence, coercion, and their dynamics. As one example, a *theory of power cycles* shall help to give a better understanding of historical processes as well as to draw conclusions for possible future developments.

We also envision an empirical investigation of the *history of cratic action*, taking into account both technological and purely intellectual developments.

We have already pointed to an important feature of bilateral social action: Namely, the initiator can choose whether he wants to make the rejection of his initiative costless for the fellow man. This option opens the possibility—or the necessity—of an *ethical study*. Whenever there is choice, the basic question of ethics arises:

What must be done? From the golden rule to Kant's categorical imperative, ethical principles typically employ some kind of symmetry. As noted above, the question of whether the initiator grants symmetric dignity to the acted-upon is central to the distinction between catallactic and cratic actions. In short, we consider the relating of "catallactic ~ ethically good" and "cratic ~ ethically bad" to be a very defensible position. In this realm, we envision reviewing Murray Rothbard's *Ethics of Liberty*, as well as benchmarking such an ethical position against the existing other candidates. Adjacent to this, an alignment with predominant concepts in the discipline of the philosophy of law should serve to further strengthen and refine our concept.

Last but not least, what follows from the fundamental possibility to choose is that cratic actions will appear in any society (except, maybe, in the improbable case of a perfect balance of power between all its members). This brings us to the important—potentially the most important—question for human coexistence and the social sciences: how a catallactic arrangement could be designed which effectively minimizes the impact of cratic actions (and of unilateral transfers), and whether such an arrangement is possible and stable in practice. Concretely, we aim at *reviving liberal constitutionalism*, reinforcing it by utilizing the sobering experience gained throughout its history.

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Bitcoin, the Regression Theorem, and the Emergence of a New Medium of Exchange

Laura Davidson and Walter E. Block

ABSTRACT: A recent controversy has brewed over whether or not the emergence of bitcoin, as a new medium of exchange, is in accordance with Mises's regression theorem. The main question in the debate seems to be, is bitcoin valued in direct use? The present paper contends that with respect to the regression theorem, this issue has no bearing on bitcoin's genesis, because it is relevant only when a new medium of exchange arises out of a pure barter economy. The debate is therefore predicated on a misinterpretation of the theorem. However, the issue of bitcoin's direct-use value, if it has one, *does* have relevance in assessing the likelihood it will become a *generally-accepted* medium of exchange—i.e. money.

KEYWORDS: money, bitcoin, regression theorem, Mises

JEL CLASSIFICATION: E59

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I. INTRODUCTION

In the last couple of years, there has been much debate online, particularly in Austro-libertarian circles, concerning the economic nature of crypto-currencies, and in particular the origin and potential future of the first crypto-currency to emerge; namely, bitcoin. There are two areas in which this debate has been focused. The first asks: "is bitcoin money? And if not, does it have the potential to become money?" The second question is: "does bitcoin have a direct-use value, and if not, does its obvious emergence as a medium of exchange therefore not refute Mises's regression theorem?" To that end, the commentators have been either searching for this value or criticizing the theorem, depending on which side they take. A subsidiary issue is whether or not it matters if bitcoin's direct-use value, if it has one, is intangible.

Most commentators agree that bitcoin *is* a medium of exchange—that is to say, there are at present market actors who willingly accept bitcoins in exchange for real goods and services, and then use them to buy other goods—but that bitcoin is *not* money, at least not yet, insofar as money is usually defined. This requires that the item be a *general* medium of exchange, acceptable to most people for purchases and sales, and at least as of 2015, bitcoin has not (yet?) achieved that status. Of course, there is a clear praxeological distinction[1] to be made between goods that are valued as media of exchange, and those that are valued only for their direct use. Thus, we must draw a clear distinction also between an economy where individuals rely on indirect exchange in some capacity, and one where they rely solely on barter.

However, there is no *praxeological* difference between a medium of exchange and money. For the difference here boils down merely to one of how one defines the word "money," and to what extent the medium in question is accepted in the market in order to meet the definition. Menger (2009, p. 11) defines money as the "universal medium of exchange," meaning it must be accepted by everyone, while Mises (1998, p. 398) more reasonably maintains it must be "generally-accepted and commonly-used," leaving some room for

[1] On praxeology, see Block (1973), Hoppe (1991, 1995), Hülsmann (1999), Mises (1969, 1998), Polleit (2008, 2011), Rothbard (1951, 1957), Selgin (1988).

the possibility that not everyone need be willing to accept it. But no matter which definitional version one chooses, it seems fairly clear that bitcoin has not yet reached the threshold of either of them.

Whether it can reach that tipping point at some point in the future is *not* a praxeological question, and is something that will be discussed in a later section. First, in Section II we turn to the issue of bitcoin and the regression theorem. Section III considers in further detail Mises's regression theorem. Section IV asks whether bitcoin violates the regression theorem, and Section V asks whether bitcoin can become money. Section VI is devoted to a hypothetical: suppose bitcoin evolved directly from barter; would this then constitute a violation of the regression theorem? We conclude in Section VII.

II. THE PRESENT DEBATE CONCERNING BITCOIN AND THE REGRESSION THEOREM

The debate has been framed by most commentators in the following way: the regression theorem refers to the emergence of a medium of exchange, where a good that was once valued only for its services in some direct use (either in consumption or production) becomes valued for its function in indirect exchange. According to these authors, bitcoin fits within the broad category of a medium of exchange. So its presence in the market must either refute the theorem on the grounds that it has never been valued directly, and certainly not as a tangible commodity like gold; or, the theorem is intact. And this can come about in one of two ways: (a) because bitcoin did indeed have some value prior to its becoming a medium of exchange, and (b) because the theory allows this value to involve an intangible good.[2]

[2] A smaller number of commentators maintain that the regression theorem refers to the emergence of *money* rather than a mere medium of exchange, and because bitcoin is not yet money, they claim it is not necessary to reconcile bitcoin's presence in the market with the theory. Indeed, say these authors, the theory proves bitcoin never will become money. However, as Murphy (2013b) points out, this argument overlooks the fact that the regression theorem is a praxeological theory, which does not concern itself with the question of why or when a medium of exchange becomes money. The transition to money is a process governed solely by the liquidity of the good in question and the psychological response of the actors, and the point at which it occurs is determined arbitrarily according to

For example, Graf (2013a, 2013b) sets out to demonstrate that bitcoin does not violate the regression theorem on the grounds that it does indeed have a prior direct-use value. Graf lists the reasons why he thinks actors might have valued bitcoin prior to it becoming a medium of exchange; for example, as a digital object for use in testing the network, or for a game, or simply because it was seen as advancing a cause. He contends there is no economic reason why a medium of exchange has to start out as a physical material as opposed to an intangible good. While Menger maintains that money has to originate as a commodity—implying that the good must be tangible—in the modern age we should consider all goods to be contenders for becoming a media of exchange, whether or not they possess any physical attributes, says Graf.

In the same vein, Tucker (2014) also searches for bitcoin's non-monetary value, noting it has an independent direct use as a payment system, this attribute of bitcoin being contained within the network and the blockchain.[3] As a result of this value, Tucker is also of the opinion that bitcoin does not invalidate the theorem.

Surda (2012, 2014) contends that if one denies that bitcoin complies with the regression theorem, one denies the *a priori* character of the theorem itself, "shooting oneself in the foot in the process." As an *a priori* argument this is incontrovertible. Since the theorem implies a medium of exchange must start out as a commodity, and it is undeniable that bitcoin *is* a medium of exchange, it must necessarily be the case that bitcoin *was* valued as a commodity prior to it being used in indirect exchange. The fact that we might remain oblivious to the motivations of the original actors, or the properties that were (or are) valued by them, has no bearing on the issue.

Faggart (2014a, 2014b, 2014c) also supports the notion that bitcoin must be reconciled with the regression theorem. He observes nevertheless that Surda's argument is circular: Even though the

a defined standard. In effect, the move from an exchange medium to a money occupies a continuum. See on this Block and Barnett (2008).

[3] "A blockchain is a transaction database shared by all nodes participating in a system based on the bitcoin protocol. A full copy of a currency's blockchain contains every transaction ever executed in the currency." From https://en.bitcoin.it/wiki/Block_chain.

theorem is apodictic, we cannot simply assume the chains of reasoning used to deduce the theory are correct. Because bitcoin was designed from the ground up to be money, and therefore did *not* appear to have a clearly identifiable original direct use, it is necessary to respond to critics who question the theorem, and we must do so by providing some kind of empirical evidence. To satisfy them, says Faggart (2014c), we must examine the history to identify when bitcoin went from being a "consumer good" to being used in indirect exchange.

Murphy (2013a, 2013b, 2014) maintains that if one wishes to square Misesean theory with bitcoin, it is quite possible to do so by envisaging that the first actors to acquire the crypto-currency did so for ideological reasons. We can compare this to the kind of value people derive from contributing to a cause or to a charity. Because of such motivations, people had a framework for evaluating its purchasing power, says Murphy. He asks if it might be possible for a medium of exchange to emerge on the market without having any direct use at all. For example, says Murphy, consider a person who is willing to be the first to give up something of market value in order to acquire a completely new good—such as a bitcoin—simply because it has the potential for becoming a medium of exchange. This alone could establish its price, and thus set the stage for its actual emergence as a medium of exchange. This assumes, of course, that the good in question has attributes that make it especially suitable for that purpose. In this case, the new medium of exchange, assuming it becomes one, would never be valued for anything other than its use in indirect exchange. Murphy then declares that if this is the case, there must be a "loophole" in Mises's argument.

Suede (2011) also embraces the idea that an object need not necessarily be valued directly before its emergence as a medium of exchange. Therefore, it is not necessary for us to look for bitcoin's value as such, or for the point in time at which it transitions from a commodity to a medium of exchange. The argument that market participants always have to experience a good in some direct way before they can use it as a medium of exchange is not true. All that is needed is for them to perceive the benefits of indirect exchange in order to invent the necessary medium. According to Suede, the indirect exchange properties of gold alone would give it value

even if it never had any other use. In a similar vein, bitcoin could emerge as a medium of exchange without any direct-exchange value, and do so even in the absence of an existing price network. As a consequence of these observations, Suede suggests that Mises's whole approach to the origin of money is erroneous.

However, what the arguments above all have in common is that they misinterpret Mises's regression theorem. Indeed, the question of whether or not bitcoin can be reconciled with the regression theorem misses the point entirely. While some of the claims raised by these commentators are very cogent, the debate has been framed in entirely the wrong terms. In order to understand why, a review of the regression theorem is appropriate.

III. MISES'S REGRESSION THEOREM

Before *The Theory of Money and Credit* was published in 1912, no one had been able to employ the lessons learnt during the marginal revolution, concerning subjective value and marginal utility theory, and apply it to money. Goods *other* than money had marginal utility, which could explain their demand and supply schedules in terms of money, but money itself could not have marginal utility—or so it was thought. How could it, asked the economists of the time? If marginal utility were applicable to money, its demand schedule could only be explained by analyzing it in terms of all the other goods on the market. But if all these goods are valued in terms of money, and yet money is valued in terms of *them*, then clearly this is a circular argument, they said. Accordingly, money was separated from praxeological theory, and from individual action.

Mises's accomplishment was to show, *without* introducing a circular argument, that the demand schedule for money *can* be explained using marginal utility theory, and that it has a downward sloping curve like any other good. In addition, he demonstrated that the demand for money is to hold for future exchanges. It is comprised of an exchange demand by those who wish to obtain money and a reservation demand by those who already possess it. Mises was able to avoid the circularity problem by introducing a time element into the argument as follows: Money is subjectively evaluated (in terms of other goods) *not* by simultaneously, and

subjectively, assessing the prices of other goods (in terms of money), but rather by employing the *objective* prices that already exist. Put another way, the subjective exchange value of money (to hold) today takes place using as a starting point the objective exchange values of yesterday. This is the crux of the theorem. Menger had laid the groundwork for establishing the technical features of money, but Menger's contribution did *not* explain how money derived its (subjective) value. As Mises ([1912] 1953, p. 116) states,

> Neither Menger, nor any of the many investigators who have tried to follow him, have even so much as attempted to solve the fundamental problem of the value of money. Broadly speaking, they have occupied themselves with checking and developing the traditional views and here and there expounding them more correctly and precisely, but they have not provided an answer to the question: What are the determinants of the objective exchange-value of money?

In *The Theory of Money and Credit*, Mises (1912) ably disposed of all the previous erroneous notions concerning the value of money: that its value was tied to the cost of production, that it was dependent on money income versus real income, or that it could be reduced to mathematical formulae, using equations of exchange and untenable variables such as the velocity of circulation.[4]

But there remained a problem, claimed the critics, for if the value of money is determined in part by the array of prices that existed yesterday, and yet those prices were derived by using a value of money that was based upon the prices extant the day before, then does this not lead to an infinite regress? No, said Mises, for if taken back far enough, there comes a point at which money first emerges as a medium of exchange out of a pure barter economy. Prior to this, it is valued only for its non-monetary uses as a commodity. The demand for money is therefore pushed back to the last day of barter, where goods are traded only in direct exchange, and where the temporal element of the regression theorem ends. It is in this way that all charges of circularity are obviated.

The regression theorem is first and foremost an argument based on praxeological deductions. It can be seen, however, that the

[4] See Rothbard (2004, pp. 831–842) and (2011, pp. 685–708) for a criticism of the equation of exchange and the notion of the velocity of money.

theorem involves two distinct elements. The first part is a causal-realist explanation of the marginal utility of money, while the second is a causal-genetic explication that deals with the origin of money. The second element explains why there is not an infinite regress, and how an economy transitions from a state in which there is only direct exchange—a state of barter—to one where indirect exchange is present.

With reference to this second element, Mises ([1912] 1953, p. 110) states:

> If the objective exchange-value of money must always be linked with a pre-existing market exchange-ratio between money and other economic goods (since otherwise individuals would not be in a position to estimate the value of the money), it follows that an object cannot be used as money unless, at the moment when its use as money begins, it already possesses an objective exchange-value based on some other use.

It is important to emphasize that what Mises refers to in this passage is the origin of a new money—*de novo*—i.e. from a pure state of barter, where there are no existing money prices. To that end, the second part of the regression theorem only explains the genesis of a new money where none existed before. It explicates how a barter economy—where all economic calculation is conducted ordinally—becomes a monetary economy in which calculation is performed cardinally. It should *not* be interpreted to mean that once a calculational framework in terms of money prices is established, that all future media of exchange (or monies) within that economy must arise from having a prior non-monetary use. The theory therefore is *not* an explanation for the origin of *all* monies or all media of exchange.

Indeed, Mises fully recognized that a new medium, such as a fiat currency, can piggyback onto any existing price framework, and that in this case, the new currency need never have been valued directly as a commodity itself. The only requirement is that the paper money's exchange value can be traced back in time, sequentially, to when only a commodity money existed, and ultimately to the point when that commodity was last used solely in barter.

From a historical perspective, fiat currencies and other paper currencies, such as "credit money," have come into existence by

being *redeemable* for the commodity money. In this way, confidence is created in the public that the new medium will be accepted in exchange. It then becomes a money. But as Mises makes clear, a paper currency can continue its monetary function even when it is no longer redeemable, provided the public continues to have confidence in its acceptability.

But there is an important point to make here. The regression theorem has nothing to say about the question of *why* subsequent currencies become established, why they continue to be accepted, or why they displace existing ones. Nor does it have anything to say about the rate at which a new currency is exchanged with the old.

Certainly, in the case of an emergent fiat currency, its redeemability at a fixed rate for the prior currency (or commodity money) is mandated by law, initially. And it might appear that this is a necessary requirement for its adoption. Moreover, it might seem that once its connection to the prior monetary system is dropped, and it becomes a true paper currency, it can do so only through the enforcement of legal-tender laws. But, empirically, we can observe that the initial legal requirement for redemption and rate-fixity is *not* a necessary condition for a new money to piggyback onto an existing one. Credit money,[5] for example, can arise without any statutory stipulations whatsoever; the redemption that it initially possesses may be based upon a contractual agreement only. Moreover, since it arises as a *credit* instrument, its initial redemptory feature is certainly not instantaneous, and not at a fixed rate. And yet despite this, and without the benefit of any legal-tender laws, it emerges as standalone currency and continues to do so, even when all connections to the previous monetary regime are severed.

How is this possible? To ask this is to ask a psychological question, because ultimately *any* money's acceptability, as an exchange medium, is determined *solely* by the psychological impulses of those using it. Credit money is possible only because individuals have enough confidence that others will accept it in exchange, once they have done so themselves. The question of why the first person accepted it as such can be answered only by delving into his mind. But even the acceptability of a fiat currency is determined by the

[5] See Mises (1912) pp. 61–62.

psychology of individual actors. One need look no further than past hyperinflations to see that legal-tender laws are no guarantee that fiat money always continues to function.

The acceptability of any new currency is not a praxeological issue. Redeemability may give market participants the confidence that the new currency will be accepted by others such that they will demand it for themselves, and legal tender laws give added impetus to these beliefs, but these notions are not related to any praxeological phenomena that govern the genesis of money. Nor is it deducible from the logic of action that once this confidence has been established, the fiat currency can continue to function as money after the redeemability has been eliminated. Historically, these sequences of events have certainly occurred, but because they are dependent on the confidence of the public, they are merely psychological phenomena.

What praxeology has to say, and what matters as far as the regression theorem is concerned, is that it is logically impossible for any new money to emerge unless there is some sort of existing price structure in place. Without prior prices present in some form, actors cannot *calculate* using the new money. And, therefore, if no price ratios have been established monetarily between the various goods and services, they can only be obtained through a process of direct exchange in the barter economy. This is the crux of the regression theorem. But there is no praxeological necessity for the new money to be redeemable for the old in law, or to trade at a fixed rate with it. Praxeology has nothing to say on the sequence of events during the transition. It merely prohibits the adoption of a new money without a calculatory framework.

After *The Theory of Money and Credit* was published, a number of economists criticized Mises on the grounds that the theory failed to explain how entirely new paper currencies can replace existing fiat monetary regimes. An example is the German Rentenmark, which was introduced to replace the paper mark in 1923 as a result of the hyperinflation that Germany experienced during the early 1920s. Clearly, this new currency neither possessed an objective-exchange value based on some other use, nor even a previous exchange value based on a commodity money. But these criticisms of Mises were misplaced, because they were founded on a misinterpretation of the regression theorem. That theorem does not contend that a new

or subsequent money must arise out of a state of barter. Nor does it attempt to explain why new monies that have *not* arisen from barter replace existing ones. It merely implies that in order for the new money to be used in economic calculation, there must be an existing price system in place upon which the new money can be superimposed, which was clearly the case with the Rentenmark.

However, the establishment of the Rentenmark is an interesting example of how the *psychological* factors come into play when a new currency replaces an existing one.

As Bresciani-Turoni (1968, p. 347) explains,

> In October and in the first half of November [of 1923] lack of confidence in the German legal currency was such that, as Luther wrote, 'any piece of paper, however problematical its guarantee, on which was written "constant value" was accepted more willingly than the paper mark.' … But on the basis of the simple fact that the [Rentenmark] had a different name from the old, the public thought it was something different from the paper mark, believed in the efficacy of the mortgage guarantee and had confidence.

The reason the Rentenmark could be used for *economic calculation* was because the memory of a price structure still existed under the paper mark, despite the latter's hyperinflation; it was this previous structure that enabled the Rentenmark to serve as a unit of account, entirely in accordance with the regression theorem. But the reason it was *accepted*, and thus came into general circulation, was purely psychological.

As Parsson (2009, pp. 11–12) states, "The Rentenmark was placed in circulation beside the devalued Reichsmark and carried no real value of its own but the naked avowal that there would be only so many Rentenmarks and no more."

A more recent example of paper money supplanting paper money is the euro, which superseded a number of existing national fiat currencies beginning in 1992. The regression theorem implies that without a price structure under the old system, it would have been impossible for the euro to become money. However, beyond this fact, the reason the euro was accepted by individuals as money was due to its anticipated acceptability in exchange. This involved various psychological factors, created in the minds of the public, by legal

tender laws, by various assurances of the government, and by its redeemability (for a while) against older currencies, that gave rise to the necessary confidence.[6] For example, initially, the exchange rates of the national monies were locked at fixed rates against each other, and then at an arbitrary rate against the new euro.

It might be objected that these examples are not sufficient to demonstrate why bitcoin does not violate the regression theorem. It might be argued, for example, that bitcoin has not been established with the aid of legal tender laws or at a fixed rate with the prior currency. But it would be a mistake to think that because other currencies have been established through fiat, that the praxeological argument with respect to bitcoin is unconvincing. Praxeological arguments can neither be proven nor disproven using empirical data. The examples we give above are merely illustrations; and the intent is only to contrast the psychological factors that can come into play with the praxeological ones. The important point to make is that psychological factors have no bearing as far as the regression theorem is concerned.

IV. DOES BITCOIN VIOLATE THE REGRESSION THEOREM?

There are no clearly definable psychological requirements for a medium of exchange to arise. This is in contrast to the praxeological necessities dictated by the regression theorem. From a praxeological perspective, it is clear from the foregoing discussion there are two separate circumstances in which a new medium of exchange can start to function as a means of calculation and unit of account: (1) The new medium emerges from a pure barter economy, in which case it must have some previous direct-use value, or (2) it emerges when there is an existing money-price structure in place, or at least the memory of one.

In this case, the new medium, whether tangible or intangible—need not have any value as a commodity in direct use, need not necessarily be "backed" by or redeemable for anything, and need not be established at a fixed rate. None of this violates or invalidates the regression theorem. Historically it is true that new media have

[6] Also, governments announced that they would only accept this new currency for tax purposes.

often incorporated some of these features as a means of creating the necessary psychological reaction to induce its acceptance, but they are not a praxeological necessity from the perspective of economic calculation. As long as prices exist in terms of the old money, this is all that is required to satisfy Mises's theorem.

What does this mean for bitcoin? Clearly, this quasi money emerged onto the scene in the presence of an existing monetary regime. Therefore, to ask whether or not it had any value in direct use prior to its becoming a medium of exchange is irrelevant as far as the regression theorem is concerned. If it was (or is) a commodity that had (or has) a non-monetary value, then to fret over whether this good is intangible or not, is also of no consequence to the theory. Since an existing price structure was in place, the regression theorem has nothing more to say on the matter. And it is not incumbent upon advocates of the regression theorem to explain how the *price* of bitcoin in terms of the existing currency was established in the absence of any legally-imposed conversion process, when the theorem has nothing to say on the matter. Beyond this, what was the critical element that bitcoin needed in order to emerge as a medium of exchange? It was for at least some actors to have enough confidence that when it was first obtained by them for goods they wished to sell, it could be spent for items they wished to buy. It may well be the case that the reason they had this confidence was because bitcoin did indeed have a prior non-monetary value. But analyzing the actors' motivations, and the factors that induced their confidence is beyond the scope of the regression theorem or any praxeological discussion. It is nevertheless an interesting question, because if bitcoin ultimately becomes money—i.e. a *generally-accepted* medium of exchange—then it would be the first non-commodity money to succeed in the absence of legal-tender laws, government assurances, or some kind of institutional backing.[7]

It would not, however, be the first non-fiat *medium of exchange* to arise this way. For example, in Argentina during the recession and financial crisis of the early 2000s, privately-issued media of

[7] Almost the very opposite is true. Bitcoin faces actual government opposition. See https://www.google.ca/?gfe_rd=cr&ei=EXk7VIS8Is2GoQT8xoHQDQ&gws_rd=ssl#q=government+opposes+bitcoin.

exchange circulated widely as a means of facilitating commercial interaction. According to Colacelli and Blackburn (2005), approximately 7 percent of the country's population traded with the so-called "Credito" during 2002. It should be pointed out this medium of exchange did not arise out of barter itself; in other words, it had no direct-use value at all. Rather, the Credito was issued by private clubs in the form of a paper chit. Even though it was initially pegged at a nominal fixed rate to the existing fiat currency, it was not redeemable for that currency. It was therefore not a money substitute, but rather a separate monetary implement. It succeeded, at least for a time, because users had enough confidence that it would generally be accepted within the orbit of the particular clubs that issued it. The Credito ultimately failed, however, as a result of counterfeiting and inflation, and because government actions to shore up the Peso led to a greater confidence in the regular fiat money. The Credito never had the attributes necessary to overcome the legal protections of the Peso, or the optimum technical properties to become a new money. It nevertheless demonstrated, before the advent of bitcoin, that privately-issued paper media of exchange can emerge in the presence of an existing currency. This example showed that it can do so without any governmental backing or promises of redeemability by the issuer; even in the face of government opposition. The question of whether or not *bitcoin* can progress to being money is discussed next.

V. CAN BITCOIN BECOME MONEY?

Carl Menger laid out the necessary attributes a good must possess in order to succeed as money; that is, to become a universal medium of exchange. It should be noted that his argument was not praxeological, in that it did not examine money on the basis of its *marginal utility*. Nor did it trace the genesis of a medium of exchange backward in time, via the kind of analysis Mises would later provide in the regression theorem. Rather, Menger's contribution was to provide an empirical and historical analysis of the origin of money, specifically when it arises from a pure barter economy.

To that end, Menger concludes that the most fundamental attribute a good must have before it can become a medium of

exchange—and ultimately the dominant medium and hence money—is its degree of saleableness (market liquidity, marketability) in direct exchange. Market liquidity, it will be noted, is subjective. It is not measurable. It has no praxeological explanation, because it is a psychological phenomenon. Liquidity depends upon several factors, according to Menger: First, upon the intensity of the demand for the commodity in question; second, upon the purchasing power of those who demand it; third, upon the availability of its supply; fourth, upon the divisibility of the commodity; fifth, upon the development of the market, in particular the level of speculation. And finally, upon the type and number of political or social restrictions that may imposed upon it. Menger then lays out the spatial and temporal limits on its liquidity, which include the distribution and permanence of its demand, its transportability, its durability, and its storage costs, etc. Other important technical aspects are its homogeneity, its recognizability, and stability in price in terms of other goods.[8]

The greater the number and intensity of these attributes, the more likely a good will be used in indirect exchange. When a less liquid good is brought to market, the seller will seek to exchange

[8] Menger was certainly not the first to discuss the necessary attributes of money, in general, or the precious metals in particular. For example, Aristotle in *Politics*, Book I, Section IX discusses how money should be transportable, divisible, and "intrinsically useful" (having a direct use). He says, "When the inhabitants of one country became more dependent on those of another, and they imported what they needed, and exported what they had too much of, money necessarily came into use." Adam Smith in his *Wealth of Nations* discusses how durability and divisibility are important characteristics of money. According to Smith ([1776] 2005, p. 26) "Metals can not only be kept with as little loss as any other commodity, scarce any thing being less perishable than they are, but they can likewise, without any loss, be divided into any number of parts, as by fusion those parts can easily be re-united again; a quality which no other equally durable commodities possess, and which, more than any other quality, renders them fit to be the instruments of commerce and circulation." With respect to precious metals, Jean Baptiste Say ([1821] 1971, p. 222) lists many of the same features: Precious metals are divisible, homogenous, resistant to friction (i.e. durable), sufficiently rare, and capable of being stamped. John Stuart Mill ([1848] 2009, p. 338) says that the reasons precious metals became money were that they "pleased everyone to posses," they are transportable, easily hidden, divisible, homogeneous, and "their purity may be ascertained and certified." And Jevons ([1875] 1898, pp. 30–39) lists the necessary attributes of good money as follows: utility and value, portability, indestructibility, homogeneity, divisibility, stability of value, and cognizability.

it not just for the good which he requires directly, but if this is not possible, for the most marketable commodity he can use indirectly. This presupposes that the actor has sufficient knowledge and confidence that the commodity in question, which is not necessarily valued by him in its direct use, can be resold. It is this information and assurance regarding a particular good's liquidity, among an increasing number of actors over time, that results in the good emerging as the most commonly-used medium. As Menger ([1892] 2009, p. 45) states,

> The reason why the *precious metals* have become the generally current medium of exchange... is because their saleableness is far and away superior to that of all other commodities, and at the same time because they are found to be specially qualified for the concomitant and subsidiary functions of money.

Of course, Menger's analysis does not refer to the emergence of paper money from a commodity money, or paper from paper. In the case of a *fiat* currency, where government mandates the money's acceptability and hence its liquidity through legal tender laws, the currency clearly has no direct use, even though many of the technical factors, such as divisibility, durability, transportability, and consistency, are still desirable.

But what about a non-fiat, non-commodity money? As discussed in the previous section, there is no praxeological necessity for any new medium of exchange to have a direct use unless it emerges from pure barter, and then only because there is no existing monetary price structure in place. But if a new medium of exchange, such as bitcoin, is set to emerge in the presence of an existing currency, then having some non-monetary uses undoubtedly increases its liquidity, which can aid in its emergence, and hasten its transition to money. Saleability inspires confidence that the new money will be accepted by others, and that the person who purchases it as a medium of exchange will not be left holding the bag at the end of the day. Once the new medium of exchange becomes established, and demand for its monetary use increases, then demand in direct use becomes less important, but at least in the beginning, non-monetary demand surely provides an important boost.

Prior to it becoming a medium of exchange, bitcoin's non-monetary demand was clearly rather limited, but it must have had

utility in some form—perhaps as a digital object, a game, a cause, a badge of membership etc.—because it began to be exchanged for fiat currency during 2009. Then, on October 5, 2009, the first exchange rate with the U.S. dollar was published. This step, and the advent of bitcoin exchanges such as Mt. Gox, demonstrated that bitcoin could be sold for the most liquid of all goods, the extant currency, and was therefore gaining in liquidity itself, even though there is no record of it being used as a medium of exchange at this point. However, given that bitcoin was designed from the ground up to be money, with all the technical features normally associated with a functional money (and many more besides) it was not too long before it started to be used in indirect exchange. According to Surda (2014), the first such documented case occurred on May 22, 2010, when Laszlo Hanyecz purchased two pizzas for 10,000 bitcoins. Obviously, at this stage, the purchasing power of bitcoin was relatively low, but as more and more people recognized its liquidity, and the possibility that it might one day become money, demand increased, primarily from speculation.

Speculation in bitcoin has at times raised its purchasing power and its exchange rate with the dollar, and given rise to the view that the "greater fool theory" is at play. Many expect that the market for bitcoin represents a bubble that will ultimately crash. North (2013) even argues that the creation of bitcoin is something akin to a Ponzi scheme. But as Rothbard ([1962] 2004, pp. 130–136) points out, speculation does not necessarily indicate economic error. To the contrary, economic agents engaging in this type of behavior might well be correct in their predictions, in which case their actions can be viewed as beneficial, for they hasten the adjustment of the commodity toward its equilibrium price. The question therefore is this: Is the increased speculative demand for bitcoin justified? No one can say for sure.[9] But while bitcoin's initial liquidity was not particularly impressive *before* it became a medium of exchange, it nevertheless possesses some truly unique features that should enhance its utility, and possibly its marketability now that it *is* a medium of exchange.

Graf (2013b) outlines some of the monetary attributes of bitcoin; it is infinitely durable, it has a finite supply, it has very small

[9] This is basically an entrepreneurial issue, not one of praxeological economics.

transaction costs, it cannot be counterfeited, it is apolitical, and it has no cross-border limitations. It also has no weight and is easier to transact with than gold. Suede (2011a) mentions that this quasi money cannot be confiscated since the files in which it resides can be replicated and hidden. Political restrictions might pose a problem, but the fact that it is peer-to-peer means the government would have to shut down the web to stop it; an unlikely prospect. Another feature is that when it is exchanged, it is done so over a network and transmitted electronically, but it is not a bitcoin substitute that is sent; rather, it is these very coins themselves. This, and the fact that bitcoin obviates the need for commercial banks, means there would be no need for money substitutes, and fiduciary media might no longer be able to be produced. Coupled with bitcoin's finite stock, it is possible that an added benefit would be the permanent termination of the business cycle,[10] provided of course bitcoin became universally used, and displaced all fiat and commodity monies. See also (Surda (2012) on this issue.

The truly unique functions of bitcoin, as detailed by Surda (2014), are *non*-monetary, and include the following: It it can act as an effective means of notarization, it can act as "smart property,"[11] it can perform conditional transfers,[12] it eliminates the need for intermediaries, particularly in multi-party transactions, it can act as a form of stock ownership eliminating the need for separate stock exchanges, it can record transactions for auditing purposes, etc. etc. These factors are of course closely associated with (but not the same as) the monetary function. This raises the interesting possibility that as bitcoin becomes more widely exchanged, and not just hoarded for speculative purposes, these unique features will become more apparent to more users, thereby increasing the demand even further, in a virtuous circle where demand and liquidity reinforce each other.

[10] For the Austrian business cycle theory that supports this contention, see Hayek (1931), Mises (1998), Rothbard (1993).

[11] Smart property is where an ownership title is contained within the blockchain. The title could be for a house, car, stocks, etc. Titles held in this way can be traded or used as collateral with very low probability of fraud. It was first proposed by Nick Szabo (1997).

[12] Any transfer that is conditional on some action or event occurring. e.g. stock options, futures, gambling.

Casey (2011) takes the view that because bitcoin is not backed by anything, it will ultimately fail. His comments are fairly typical of those who view the market as a bubble: "bitcoins are just an electronic abstraction. They can't be used for anything else, nor are they made of something that can be used for anything else...."

Now it is true historically that commodity monies such as gold and silver have had a direct use as jewelry, etc. But as Mises makes clear, once a medium becomes generally accepted by the public, and hence money, the underlying direct use can disappear entirely, even though the commodity still continues to function as money. Liquidity gives rise to more liquidity as confidence in the new money increases. Thus, the cause of the original liquidity—its direct use—becomes less and less important. Moreover, money *always* functions only as long as people have confidence in it, and this is true even if it *does* have a concurrent direct use. Even if gold were once again to become the universally accepted medium of exchange, it would not be "backed" by something of equal value. This is because, *ceteris paribus*, when a commodity becomes money, the increased exchange demand causes its price (in terms of other goods) to become higher—typically orders of magnitude higher—than the price it would be if used as a commodity only. Since the increased exchange demand can be said to represent people's confidence, anticipation, expectation etc., that it will continue to be universally accepted in indirect exchange, it must be the case that if people's confidence were to fail, its price would fall. If gold's ability to perform its function as money suddenly evaporated in the minds of market participants—let us say another money were discovered that was generally recognized as being superior—gold money users would soon find their money was "backed" by relatively little.[13] This of course is true also of a fiat currency, where initial confidence is provided by government guarantees and maintained by legal tender laws and tax policy. If all confidence in the government is lost, the underlying true very limited or non-existent value of the paper is soon revealed.

VI. A HYPOTHETICAL

Posit that bitcoin evolved as money directly from barter; would this then constitute a violation of the regression theorem? Before

[13] But not nothing. This metal would still be useful for jewelry, false teeth, etc.

we attempt to answer this question, we note that this supposition is patently false. Bitcoin is a product of the twenty-first century, quite distant from the time in which barter was the generally accepted way of facilitating trade, if it ever even existed. Moreover, it is highly doubtful that a digital object requiring an extremely complex infrastructure, such as the internet, could ever develop in a pure barter economy, where the division of labor is almost non-existent.

Why make this query then? We step out of reality in this manner so as to make an important economic distinction. Economists do not have controlled experiments at their disposal, and thus must be excused for engaging in contrary to fact conditionals.

So assume bitcoin has arisen, *de novo*, from a pure barter economy. If the regression theorem says that money can only arise out of a commodity, and "commodity" means tangible good, then that theorem is wrong. Assuming bitcoin is a money (it is not yet generally accepted, although one day it might be) the regression theorem is wrong because bitcoin is not, and was never, a commodity. On the other hand, if the regression theorem says that money must arise out of something that is of value, then the regression theorem is correct. Bitcoins were something "of value" to at least some people even at their inception. So what does the regression theorem actually say?

How does the analysis of those analyzing the regression theorem stack up against this criterion? Most speak of it in terms of a commodity, not something of value.

For example, Rothbard clarifies (1963; emphasis added by present authors):

> This process: the cumulative development of a medium of exchange on the free market—is the only way money can become established. Money cannot originate in any other way, neither by everyone suddenly deciding to create money out of useless material, nor by government calling bits of paper "money." For embedded in the demand for money is knowledge of the money-prices of the immediate past; in contrast to directly-used consumers' or producers' goods, money must have preexisting prices on which to ground a demand. But the only way this can happen is by beginning with a useful *commodity* under barter, and then adding demand for a medium for exchange to the previous demand for direct use (e.g., for ornaments, in the case of gold). Thus, government is

> powerless to create money for the economy; it can only be developed by the processes of the free market.

And in the view of Mises (1912; emphasis added):

> The unsatisfactory results offered by the subjective theory of value might seem to justify the opinion that this doctrine and especially its proposition concerning the significance of marginal utility must necessarily fall short as a means of dealing with the problem of money. According to his argument, the objective exchange value of money is not determined at all by the processes of the market in which money and the other economic goods are exchanged. If the money price of a single *commodity* or group of commodities is wrongly assessed in the market, then the resulting maladjustments of the supply and demand and the production and consumption of this *commodity* or group of *commodities* will sooner or later bring about the necessary correction. If, on the other hand, all *commodity* prices, or the average price level, should for any reason be raised or lowered, there is no factor in the circumstances of the *commodity* market that could bring about a reaction. Consequently, if there is to be any reaction at all against a price assessment that is either too high or too low it must in some way or other originate outside the *commodity* market.

When Mises and Rothbard penned these words, there were no digital goods in existence. For these economists, intangible goods (in the broadest sense) were labor services, trademarks, goodwill, etc., and various financial assets such as insurance policies, stocks and bonds.

Now it is very difficult to explain how intangible goods like these could ever become media of exchange, let alone money. For example, suppose Smith sells a cow to Jones, in exchange for 20 hours of Jones's labor, and then Smith, instead of asking Jones to work for him, exchanges this labor (or some portion of it) with Green to buy, say, a bushel of wheat. It is true that Jones's labor is being used by Smith in an indirect way to sell his cow and buy a bushel of wheat from Green. But it is certainly very doubtful that Jones's labor could ever become money. One immediate problem is that Jones cannot be everywhere, and therefore there would have to be multiple Jones's, all agreeing to use their labor as media of exchange. But labor is never completely nonspecific, so there would be no homogeneity. It could never serve as a unit of account. This lack of homogeneity is true for all other (non-digital) intangible assets. Therefore, it would never have occurred to Mises and Rothbard that intangible goods

could ever be used as money. It seems absurd. It would not be unreasonable for them to assert that *de novo* money must arise from a tangible good.

However, for the modern economist, the digital age changes the notion of an intangible good. Intangible digital goods can be replicated to create identical units; they can be completely homogeneous. In an important sense, they can be even more homogenous than any physical good can ever be. Moreover, they can be instantly transportable over the internet, and almost infinitely divisible and durable. Until the development of bitcoin, digital goods would not have made a good money. However, bitcoin combines the features of an algorithm that limits supply, with a method of verifying transactions (in the blockchain) that limits double spending, and employs asymmetric cryptography that uses elliptic curve functions with no solution. In this way digital objects can be made to be extremely secure, with a supply that cannot be counterfeited or inflated.[14] In short, there now exist intangible goods that can have all the characteristics of money.

Let us assume that by using the word "commodity," Mises and Rothbard meant a *tangible* commodity, like gold, and not an intangible one. If so, were they in error when they said that money that arises from barter must be a "commodity?" Would it have been more correct to say that it must have direct-use "value," thereby encompassing *all* goods, not merely tangible ones? It seems a bit harsh to say they were wrong, knowing what we now know about digital goods, and positing an almost impossible world where digital objects like bitcoin emerge in a pure barter economy. But strictly speaking, in order to account for all possibilities, even unlikely ones, it would indeed be more complete to say that the regression theorem *should* imply that when money first emerges from a pure state of barter—and a cardinal calculational framework is created for the first time—the good in question must have prior *value* in direct use.

VII. CONCLUSION

Mises's regression theorem is a praxeological analysis of the marginal utility of money. It states that the subjective money

[14] Inflated beyond a finite amount; in the case of bitcoin, 21 million units.

prices used in calculation, today, are based in part on the objective money prices of yesterday. For any good to be used as a medium of exchange, an objective framework of prices must already be in existence. Because the very first medium of exchange to emerge must have done so when there were *no* money prices, it follows that this good must originally have been valued, and bartered, in direct exchange. The regression theorem does *not* say that all subsequent media of exchange must have been exchanged directly or have a direct-use value.

Menger's earlier discussion on the origin of money is an empirical and historical analysis. It says that because money—the generally-accepted medium of exchange—is the most liquid good, it follows that items with a high degree of liquidity in direct exchange are the most likely to emerge as money in indirect exchange. But there is no praxeological necessity that money must have a direct use in order to be salable. The marketability of money depends on the confidence of market participants. Liquidity is a psychological phenomenon.

Those who seek to determine if bitcoin violates the regression theorem, by asking whether or not it has been valued directly, are barking up the wrong tree. Bitcoin does not *need* to have a direct-use value in order to be a medium of exchange, because it did not emerge from a pure barter economy. This medium of exchange therefore does not violate the theorem. Clearly, it *does* have such a value, because it was directly exchanged for other goods, including the U.S. dollar. This provided the initial liquidity, which helped it to become a medium of exchange. Will bitcoin ever become liquid enough to become generally accepted, and hence money? It is unique among all previous media of exchange[15] in that it incorporates numerous novel features, many of which offer up their services only when it is *used* as a medium of exchange. This means that as it becomes more widely adopted, it is probable its liquidity will increase, not just because more people will accept it for its monetary uses, but also because more people recognize the advantages of its non-monetary uses. Whether or not it can ever become money remains to be seen.

[15] For example, Hayek's (1978) "ducat." For a critique, see Rothbard (1992).

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Publication Activity in Austrian Journals 2001–2010

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ABSTRACT: Journal publications are used to rank institutions by research productivity in Austrian economics. An incidental byproduct is a ranking of scholars in the Austrian school. Ranking methodology is developed based on the established mainstream literature. Implications for the future evolution of the Austrian school are suggested and discussed.

KEYWORDS: quality ranking, economics program, Austrian school of economics

JEL CLASSIFICATION: A11, A14, B25, B53

1. INTRODUCTION

This paper undertakes to rank Austrian scholars and their institutions by research productivity over the 2001–2010 decade. This has been a period marked by economic turmoil and renewed interest in Austrian economics. Although Keynesian economics is

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often cited as a justification for policy responses to the 2007–2009 financial crisis, recession, and their aftermath, with the exception of the post-Keynesian Financial Instability Hypothesis (Minsky, 1982), only the Austrian school offers any traction in explaining the causes of the recession or why Keynesian stimulus has proved, not just ineffective, but counterproductive.

This study employs the three North American serials devoted exclusively to research in Austrian economics—two quarterly journals and an annual publication. Rankings of scholars based on publication in these three publications may be subject to bias from disregarding books and other publications of the Austrian school, or publications in the Austrian tradition which appear in mainstream journals. Conceptually, whatever bias this may introduce can be largely disregarded because, generally speaking, an Austrian researcher who publishes frequently in mainstream journals is likely to have published often in the three Austrian journals (Sutter, 2011). Because such idiosyncrasies tend to be averaged out through aggregation, rankings of programs as opposed to rankings of individual scholars, appear far more reasonable and less problematic. However, while Austrian graduate programs are unsurprisingly found to rank very high, most other ranked programs either do not offer graduate degrees, and of those that do, few offer any distinctive specialization in Austrian economics. Geographic diversity is very broad, though dominated by North America first, and Europe second, particularly France. Non-academic institutions are also well represented, including think tanks, government agencies, and private firms.

The remainder of this article is organized as follows. Section two addresses why rankings are useful. Section three reviews the mainstream ranking literature and explains the methodology employed in the present paper. Section four presents rankings of individual authors. Section five presents rankings of institutional output. Section six discusses the significance and implications of the ranking tables. Section seven presents concluding comments.

2. WHY RANK PROGRAMS IN AUSTRIAN ECONOMICS?

Mainstream ranking studies (Graves, Marchand, and Thompson, 1982, p. 1131; Scott and Mitias, 1996, p. 378) suggest economics

department rankings benefit faculty job searchers as indicators of the research environment at particular institutions, and benefit graduate students as indicators of faculty research currency and expected dissertation quality. Departmental rankings offer general information about mainstream departments based on mainstream metrics—which are at least potentially useful for Austrian scholars—however, to be most useful for the Austrian school, rankings need a specifically Austrian focus. This is provided here by examining publications in the three leading Austrian serials. Apart from mimicking a feature of the mainstream literature which largely overlooks us, the ranking exercise offers a statistical portrait of each department in terms of its publications, output, and productivity. As Dusansky and Vernon (1998b, p. 235) note, "there are many ways to measure the productivity and standing of economics departments." The metric used in this paper is publications in the three core journals of the Austrian school over a recent ten-year period. This reflects current productivity over that period, though it is twice as long as Dusansky and Vernon's (1998a) five-year window. Arguments that other cited work, influence, reputation, publication in non-Austrian or not-exclusively-Austrian journals would improve the meaningfulness and validity of these rankings fail to consider that the various measures of research productivity are highly correlated. Departments which produce a lot of one kind of research are likely to produce a lot as measured by alternative methods.

3. LITERATURE AND METHODOLOGY

The literature ranking economics programs dates to Fusfeld's (1956) study of American Economic Association (AEA) meeting programs, which led in short order to Cleary and Edwards's (1960) examination of publications in the *American Economic Review*, and Yotopoulos's (1961) study added the *Journal of Political Economy* and the *Quarterly Journal of Economics*. These rankings did not aspire to the degree of comprehensiveness to which later studies often pretended, and were intended to supplement surveys of graduate programs in economics which were then done by organizations such as the AEA, and the Carnegie and Ford Foundations. More recently, similar rankings have been published by the National Research Council, an affiliate of the U.S. National Academy of Sciences, and by *U.S. News & World Report*.

The second generation of ranking articles, examining roughly the 1960s, were similarly limited to the top three journals. Siegfried (1972) and Moore (1973) ranked doctoral programs by the publishing performance of their faculty, also presenting regression analyses in an effort to examine factors explaining their rankings. Hogan (1973) ranked economics Ph.D. programs by publishing performance, not of programs' faculty, but of their graduates, for 1960–1969. Smith and Gold (1972) ranked Southern (i.e., Southeastern U.S.) departments for the 1968–1971 and 1970–1974 periods, and Niemi (1975) also ranked them for the 1970–1974 period, reflecting a new emphasis on publishing adopted by leading institutions in the region. Ladd and Lipsett (1979) presented reputational surveys, but the majority of the literature ranking economics programs has always favored purportedly objective approaches.

More recent studies typically relied on broader samples of top journals, using approximately 24–40 publications. These studies included Graves, Marchand, and Thompson (1982) for 1974–1978; Medoff (1989); Berger and Scott (1990) for 1983–1988, reverting to the three publication approach; Conroy, Dusansky, and Kildegard (1995) for 1987–1991; Miller (1996); Scott and Mitias (1996) for 1984–1993; and Dusansky and Vernon (1998a), using eight journals, with comment by Feinberg, Grilliches, and Einav (1998). Graves, Marchand, and Thompson (1982) performed regression analyses attempting to identify factors determining program rankings. Each of these studies reviewed the growing body of ranking literature, and often attempted to address perceived limitations of earlier rankings. Laband and Piette's (1994) journal rankings were used in some of these studies to motivate a more comprehensive selection of top and field journals, or to weight journals by impact, as well as by page size. Tschirhart (1989) ranked departments over the 1975–1984 period by fields of specialization, and Tremblay et al. (1990) did the same for 1980–1986. Medoff (1989) and Palacios-Huerta and Volij (2004) ranked individual scholars and their impact, rather than departments. A number of alternative rankings of European and international programs were presented in the inaugural issue of the *Journal of the European Economic Association*: by Combes and Linnemer (2003), Coupe (2003), Kalaitzidakis et al. (2003), and Lubrano et al. (2003). Ellison (2002) proposed a model to explain how journal articles generally evolved over time.

In a sense, harkening back to the earlier studies using publications in the *American Economic Review*, the *Journal of Political Economy*, and the *Quarterly Journal of Economics*, three Austrian serials were selected for inclusion in the present study: two quarterly journals, the *Quarterly Journal of Austrian Economics* (*QJAE*), and the *Review of Austrian Economics* (*RAE*), as well as the annual *Advances in Austrian Economics* (*AAE*). No effort was made to evaluate each journal for impact, implicitly assuming little difference. Other journals might appropriately been considered, such as the venerable *Journal des Économistes et des Études Humaines* (*JEEH*), the *Cato Journal*, *Critical Review*, *Public Choice*, *Constitutional Political Economy*, *Studies in Emergent Order*, and the *Journal of Private Enterprise*. However, what this would have gained in inclusiveness would impose a cost in that not all (and perhaps not even the majority of) articles published in some of these journals are representative of the Austrian school or written in the Austrian tradition. In addition, the sample would also have been skewed by the emphasis certain of these journals have on particular fields, such as policy analysis, public choice, or law and economics. This would have either diluted the value of the rankings by including numerous non-Austrian articles, or inserted a questionable and subjective choice on the part of the investigator of which articles to include/exclude from a particular journal.[1] A bias from overemphasizing particular fields would also be problematic. The same issues would have been presented by including books. Excluding books is admittedly less defensible, because books represent a larger and more important portion of the research output of many of today's leading Austrian scholars, than is perhaps otherwise typical among academic economists. In ranking individual scholars, a number of prominent and highly-productive individuals appear to rank relatively low due to the choice of journals, either because their output is represented more by books, or by articles in journals other than the three included in this study.

Advances in Austrian Economics is an annual publication, each issue of which centers around a special topic or theme. Virtually all articles published in the *Advances* are invited by the issue's

[1] An anonymous *QJAE* reviewer suggests using the Austrian JEL code (B53) to identify Austrian articles published in non-Austrian journals. This would avoid a subjective bias.

guest editor, who also contributes an introductory article. In many ways the *Advances* can be considered the Austrian counterpart to the *Journal of Economic Perspectives*, because of its thematic nature and editorial practices. Because each issue of the *Advances* has a special topic, this is not an outlet that is generally open to scholars working in other areas.[2] The quarterly journals also have occasional special issues, which perhaps injects the same kind of bias, but this represents far less of their available pages.

Articles were not weighted by page size or length—although this has become a standard feature of the ranking literature, the fact remains that some of the most important articles the discipline has produced are distinguished by concision, and some of the least by verbosity. Sutter (2011) notes how weighting by number of pages published fails to affect rankings in any significant or meaningful way, and the present study supports this interpretation. The number of journals simplified data collection tremendously. The *Quarterly Journal of Austrian Economics* is the only one of the three to have published continuously over the decade, except that only three issues appeared in 2008 (vol. 11). Publication of *Advances in Austrian Economics* was disrupted briefly in the late 1990s and did not resume until 2003. The *Review of Austrian Economics* published only three times annually from 2001–2008 (vols. 14–21, with issues numbered 1, 2/3, and 4, or 1, 2, and 3/4), but has published four issues a year ever since. The *Journal des Économistes et des Études Humaines*, which began publication in 1841, might have been included, but suspended publication from 2005–2009.

All articles were counted, including book reviews and introductory or interpretive articles contributed by guest editors of special issues. This last is an occasional feature of the *RAE* and *QJAE*, but is present in all volumes of the *AAE*. Two rankings are provided in tables 1–4. Weighted rankings, which are emphasized as the primary ranking, attribute one point for each article in the three journals over the 2001–2010 period, divided equally among coauthors and their institutions. In these rankings, each article

[2] This is why Sutter (2011) excluded the *AAE* from his study. His rankings are broadly similar to those reported here, though he only included articles from the *QJAE* and the *RAE*. He covered a nearly identical time period (2000–2009) as this study, though he also excluded book reviews.

counts as one article. In contrast, unweighted rankings are also provided which attribute one equal point to each appearance of an author or coauthor. As a result, in unweighted rankings, coauthored articles are weighted more heavily, with one full point for each coauthor and their institution. This approach counts coauthored articles more, and reflects how publications may be evaluated for tenure, promotion, and reappointment at some schools.[3] Offering both sets of rankings allows comparisons of rankings done on the basis of the number of appearances in the three journals as an author or coauthor, with rankings weighting sole authorship more highly. I do not consider one of these rankings superior or more valid, and propose they be considered as indicators of the ambiguity of the whole process in principle. Articles were not weighted by page length, as was done in many earlier rankings, nor adjusted by page size, which would have been moot, since the journals are basically identical in size.

There are a number of reasons to include book reviews, though such review articles were not generally included in the earlier mainstream ranking literature. Review articles constitute legitimate scholarship, and help promote the research of the scholars being reviewed. Although not cited as widely as some articles, they are in fact cited by other scholars. In addition to the scholarly journals, virtually every book published in the Austrian tradition has been reviewed by David Gordon in the *Mises Review*.[4]

Referees offered several suggestions for including citation counts as a measure of scholarly impact. If feasible, this would have been

[3] Some institutions evaluate scholarly output for tenure by apportioning credit for coauthored publications among the various authors. Shares of credit are equal by default, but in some cases can be apportioned unequally to recognize the greater contribution of one or some coauthors—normally, when collaborators are at the same institutions, they must mutually agree to a particular unequal distribution of credit for a given article. This can be contentious if it was not agreed to in advance. At other institutions, no formal distinction is made between sole-authored and coauthored articles. Note that both approaches are identical for scholars who have not written coauthored articles.

[4] An anonymous *QJAE* reviewer cautions: "A book review is certainly not equal to an article as a scholarly exercise. At virtually any institution, a scholar with half a dozen research articles and no book reviews will have a strong case for tenure. A scholar with half a dozen book reviews and no research articles will not." Untenured faculty should keep this firmly in mind and act accordingly.

a worthwhile undertaking. Unfortunately, services such as Google Scholar provide the most cursory and questionable automated counts which attempt to include virtually anything mentioned on the internet, whether published or refereed or not, and only provide this count for the registered scholar—it is not available to any other researchers, and would not be acceptable for this purpose even if it were so available. Furthermore, Google Scholar does not include research posted before 2008, so it only includes data for the last two years of the decade under study. The Social Science Research Network (SSRN), ArXive, and ResearchGate provide some of the information that would be needed to rank according to citation count, but only for registered account holders, and in some cases only on archived working papers and articles. The widely-used Social Sciences Citation Index (SSCI) has been criticized as biased and non-transparent (Klein and Chiang, 2004). It includes some non-scholarly periodicals, and fails to include most of the scholarly journals that would make it more appropriate for use in the present study.

4. RANKING SCHOLARS

First, Austrian scholars are ranked by number of publications. Table 1 provides weighted article counts, where coauthorship is apportioned equally for each article, and unweighted article counts, where coauthorship is counted the same as sole authorship. Ranks based on both schemes are provided.

Table 1: Scholar Rankings

	Scholar	Weighted article count	Weighted rank	Unweighted article count	Unweighted rank
1	Randall G. Holcombe	13	1	13	2
2	Walter Block	12.66	2	18	1
3	Mark Thornton	11.50	3	12	3
4	Robert F. Mulligan	8	4	9	5
5	Jörg Guido Hülsmann	8	4	8	6
6	William Barnett II	7.66	5	13	2
7	Joseph T. Salerno	7.33	6	8	6
8	Roger G. Koppl	7	7	8	6
9	Steven Horwitz	7	7	8	6
10	Peter Lewin	6	8	7	7
11	William N. Butos	6	8	7	7
12	Sanford Ikeda	6	8	6	8
13	Peter J. Boettke	5.25	9	11	4
14	Greg Kaza	5	10	5	9
15	Richard E. Wagner	5	10	5	9
16	Christopher J. Coyne	4.83	11	11	4
17	Bryan Caplan	4.50	12	5	9
18	Virgil H. Storr	4.50	12	5	9
19	Philipp Bagus	4	13	5	9
20	G.R. Steele	4	13	4	10
21	Giandomenica Beccio	4	13	4	10
22	Hans-Hermann Hoppe	4	13	4	10
23	John Brätland	4	13	4	10
24	Larry J. Sechrest	4	13	4	10
25	Laurent Carnis	4	13	4	10
26	Leland B. Yeager	4	13	4	10
27	John P. Cochran	3.83	14	5	9
28	Nicolai J. Foss	3.50	15	5	9
29	William L. Anderson	3.50	15	4	10
30	Andrew Farrant	3	16	4	10
31	David Howden	3	16	4	10
32	Emily Chamlee-Wright	3	16	4	10
33	Art Carden	3	16	3	11
34	Bogdan Glăvan	3	16	3	11
35	Bruce L. Benson	3	16	3	11

	Scholar	Weighted article count	Weighted rank	Unweighted article count	Unweighted rank
36	Douglas G. Whitman	3	16	3	11
37	Enrico Colombatto	3	16	3	11
38	Geoffrey M. Hodgson	3	16	3	11
39	George Reisman	3	16	3	11
40	Guido Zimmermann	3	16	3	11
41	Nikolay Gertchev	3	16	3	11
42	Peter Kurrild-Klitgaard	3	16	3	11
43	Peter T. Leeson	2.75	17	6	8
44	J. Robert Subrick	2.50	18	4	10
45	Benjamin Powell	2.50	18	3	11
46	Clifford F. Thies	2.50	18	3	11
47	Paul Lewis	2.50	18	3	11
48	Roger W. Garrison	2.50	18	3	11
49	Thierry Aimar	2.50	18	3	11
50	Thomas J. McQuade	2.50	18	3	11
51	Tyler Cowen	2.50	18	3	11
52	Lowell Gallaway	2	19	4	10
53	Richard Vedder	2	19	4	10
54	Anthony J. Evans	2	19	3	11
55	David M. Levy	2	19	3	11
56	Edward Stringham	2	19	3	11
57	Gene Callahan	2	19	3	11
58	J. Barkley Rosser	2	19	3	11
59	Adam Gifford	2	19	2	12
60	Alfred G. Wirth	2	19	2	12
61	Anders Liljenberg	2	19	2	12
62	Bart Nooteboom	2	19	2	12
63	David B. Skarbek	2	19	2	12
64	George C. Bitros	2	19	2	12
65	Hansjörg Klausinger	2	19	2	12
66	J. Patrick Gunning	2	19	2	12
67	Jeffrey Herbener	2	19	2	12
68	Mark Brandly	2	19	2	12
69	Nikolai Wenzel	2	19	2	12
70	Peter J. Phillips	2	19	2	12
71	Renaud Filleule	2	19	2	12

	Scholar	Weighted article count	Weighted rank	Unweighted article count	Unweighted rank
72	Richard N. Langois	2	19	2	12
73	Robert L. Bradley	2	19	2	12
74	Roderick T. Long	2	19	2	12
75	Roger D. Congleton	2	19	2	12
76	Salim Rashid	2	19	2	12
77	Samuel Bostaph	2	19	2	12
78	Shawn Ritenour	2	19	2	12
79	Theodore Burczak	2	19	2	12
80	Young Back Choi	2	19	2	12
81	Anthony M. Carilli	1.91	20	5	9

Weighted and unweighted rankings display subtle differences, but there are no dramatic surprises. Note that it is possible for a researcher to rank somewhat lower in the weighted ranking, but higher in the unweighted ranking, because they publish frequently, but usually in collaboration with others. The gross validity of the individual rankings presented in table 1 must be approached with a strong dose of sodium, particularly because they ignore any part of a scholar's output not published in the three Austrian journals included in the study. These shortcomings are less apparent in the program rankings presented in tables 2-4. The larger a department, or the stronger the Austrian representation among its makeup, the less important would be any purported bias from ignoring books or articles in other journals.

5. RANKING PROGRAMS

The real value in ranking publication output is less in ranking individual scholars, but departments and institutions. One complicating factor is that sometimes the institutional affiliation changes during the period under study, resulting in an individual's research output being split among two or more institutions. Austrian doctoral candidates often publish before receiving their degrees—a particularly praiseworthy and notable phenomenon, which remains fairly exceptional within the profession. These publications by graduate students are attributed to the graduate

institution. Institutional affiliation indicated on the article, i.e., at the time of publication, was always used—in the face of faculty mobility, this results in the output of some scholars being divided among two or more institutions over the decade. As in table 1, weighted and unweighted rankings are provided. In the unweighted ranking, coauthored articles receive one point for each author, and because coauthors often come from the same institution, this might be a source of bias.

Table 2: Overall Institutional Rankings

	Institution	Weighted article count	Weighted rank	Scholars per institution	Weighted article count per scholar	Unweighted article count	Unweighted rank
1	*George Mason University	51.83	1	32	1.62	67	1
2	Loyola University	19.66	2	4	4.92	32	2
3	Mises Institute	18	3	5	3.60	19	3
4	*Florida State University	16	4	2	8.00	16	4
5	*Auburn University	10.50	5	6	1.75	12	7
6	Western Carolina University	8	6	1	8.00	9	9
7	Pace University	8	6	3	2.67	10	8
8	Fairleigh Dickinson University	7	7	1	7.00	8	10
9	St. Lawrence University	7	7	1	7.00	8	10
10	*University of Torino	7	7	2	3.50	7	11
11	*West Virginia University	6.83	8	7	0.98	14	5
12	*University of Texas at Dallas	6.50	9	2	3.25	8	10

	Institution	Weighted article count	Weighted rank	Scholars per institution	Weighted article count per scholar	Unweighted article count	Unweighted rank
13	Trinity College	6	10	1	6.00	7	11
14	California State University Northridge	6	10	3	2.00	6	12
15	SUNY Purchase	6	10	1	6.00	6	12
16	Hampden-Sydney College	5.33	11	5	1.07	13	6
17	*Université de Nancy 2	5	12	4	1.25	6	12
18	*Lancaster University	5	12	3	1.67	5	13
19	University of Nevada at Las Vegas	5	12	2	2.50	5	13
20	San Jose State University	4.83	13	7	0.69	8	10
21	Metropolitan State College of Denver	4.66	14	2	2.33	7	11
22	*New York University	4.50	15	3	1.50	5	13
23	Ohio University	4	16	2	2.00	8	10
24	*Copenhagen Business School	4	16	2	2.00	6	12
25	*University of Southern Denmark	4	16	3	1.33	5	13
26	Arkansas Policy Foundation	4	16	1	4.00	4	14
27	Grove City College	4	16	2	2.00	4	14
28	Sul Ross State University	4	16	1	4.00	4	14

	Institution	Weighted article count	Weighted rank	Scholars per institution	Weighted article count per scholar	Unweighted article count	Unweighted rank
29	U.S. Department of the Interior	4	16	1	4.00	4	14
30	*University of Queensland	3.67	17	2	1.84	5	13
31	James Madison University	3.50	18	3	1.17	6	12
32	Hillsdale College	3.50	18	3	1.17	4	14
33	Beloit College	3	19	1	3.00	4	14
34	Dickinson College	3	19	2	1.50	4	14
35	Frostburg State University	3	19	2	1.50	4	14
36	*King Juan Carlos University Madrid	3	19	1	3.00	4	14
37	*London School of Economics	3	19	3	1.00	3	15
38	Pepperdine University	3	19	1	3.00	3	15
39	Rhodes College	3	19	1	3.00	3	15
40	*Romanian-American University in Bucharest	3	19	1	3.00	3	15
41	*Stockholm School of Economics	3	19	2	1.50	3	15
42	*Université d'Angers	3	19	2	1.50	3	15
43	*University of Connecticut	3	19	2	1.50	3	15
44	*University of Hertfordshire	3	19	1	3.00	3	15

Note—doctoral-granting institutions are indicated by *.

These data can be used to compare average productivity of faculty in each department. The number of different authors publishing while affiliated with each institution is provided, and dividing the weighted article count by the number of authors adjusts to some extent for differences in department size. Note however, that only scholars who published in one of the three journals over the period under study are included, and that for doctoral-granting programs, this includes graduate students, so it tends to lower—i.e. improve—the ranking for a department with a large graduate program where doctoral candidates are successfully encouraged to publish before graduation.

Table 3 includes only doctoral-degree-granting institutions. The rationale for separating these schools out is that some of the publications they generate are authored or coauthored by doctoral candidates and other graduate students, in addition to members of the faculty. Thus these institutions have a natural advantage over non-doctoral-degree-granting schools.

Table 3: Ranking of Doctoral Institutions

	Institution	Weighted article count	Weighted rank	Unweighted article count	Unweighted rank
1	George Mason University	51.83	1	67	1
2	Florida State University	16	2	16	2
3	Auburn University	10.50	3	12	4
4	University of Torino	7	4	7	6
5	West Virginia University	6.83	5	14	3
6	University of Texas at Dallas	6.50	6	8	5
7	Université de Nancy 2	5	7	6	7
8	Lancaster University	5	7	5	8
9	New York University	4.50	8	5	8
10	Copenhagen Business School	4	9	6	7
11	University of Southern Denmark	4	9	5	8
12	University of Queensland	3.67	10	5	8
13	King Juan Carlos University Madrid	3	11	4	9

	Institution	Weighted article count	Weighted rank	Unweighted article count	Unweighted rank
14	London School of Economics	3	11	3	10
15	Romanian-American University in Bucharest	3	11	3	10
16	Stockholm School of Economics	3	11	3	10
17	Université de Lille 1	3	11	3	10
18	Université d'Angers	3	11	3	10
19	University of Connecticut	3	11	3	10
20	University of Hertfordshire	3	11	3	10

Non-doctoral institutions, including some non-academic institutions, are ranked separately in Table 4. It would generally be accepted that these institutions do not compete with the doctoral-granting institutions.

Table 4: Non-Doctoral Institution Rankings

	Institution	Weighted article count	Weighted rank	Unweighted article count	Unweighted rank
1	Loyola University	19.66	1	32	1
2	Mises Institute	18	2	19	2
3	Western Carolina University	8	3	9	5
4	Pace University	8	3	10	4
5	Fairleigh Dickinson University	7	4	8	6
6	St. Lawrence University	7	4	8	6
7	Trinity College (New Haven)	6	5	7	7
8	California State University Northridge	6	5	6	8
9	State University of New York at Purchase	6	5	6	8
10	Hampden-Sydney College	5.33	6	13	3
11	University of Nevada at Las Vegas	5	7	5	9

	Institution	Weighted article count	Weighted rank	Unweighted article count	Unweighted rank
12	San Jose State University	4.83	8	8	6
13	Metropolitan State College of Denver	4.66	9	7	7
14	Ohio University	4	10	8	6
15	Arkansas Policy Foundation	4	10	4	10
16	Grove City College	4	10	4	10
17	Sul Ross State University	4	10	4	10
18	U.S. Department of the Interior	4	10	4	10
19	James Madison University	3.50	11	6	8
20	Hillsdale College	3.50	11	4	10
21	Beloit College	3	12	4	10
22	Dickinson College	3	12	4	10
23	Frostburg State University	3	12	4	10
24	Pepperdine University	3	12	3	11
25	Rhodes College	3	12	3	11
26	Dartmouth College	2.50	13	3	11
27	Shenandoah University	2.50	13	3	11
28	University of Central Arkansas	2.50	13	3	11
29	University of North Texas	2.50	13	3	11

In table 5, countries are ranked by output. The number of publishing scholars for each country divided by the number of institutions gives average scholars per institution for each country. Weighted article count divided by the number of publishing scholars gives average productivity per scholar for each country. Weighted article count divided by the number of institutions gives the average productivity per institution for each country.

Table 5: Geographic Distribution

	Country	Article count	Rank	No. Institutions	No. Scholars	Average scholars per institution	Average article productivity per scholar	Average article productivity per institution
1	U.S.	374.96	1	140	475	3.393	0.789	2.678
2	France	33.67	2	24	41	1.708	0.821	1.403
3	U.K.	33.50	3	21	38	1.810	0.882	1.595
4	Italy	16.83	4	9	21	2.333	0.802	1.870
5	Germany	12.83	5	11	15	1.364	0.856	1.167
6	Australia	9.67	6	5	11	2.200	0.879	1.933
7	Denmark	8.00	7	2	11	5.500	0.727	4.000
8	Sweden	6.00	8	4	6	1.500	1.000	1.500
9	Spain	5.00	9	3	6	2.000	0.833	1.667
10	Canada	4.00	10	4	5	1.250	0.800	1.000
11	Romania	4.00	10	2	4	2.000	1.000	2.000
12	Nether-lands	3.50	11	3	4	1.333	0.875	1.167
13	Austria	3.00	12	2	3	1.500	1.000	1.500
14	Finland	3.00	12	2	3	1.500	1.000	1.500
15	Greece	3.00	12	2	3	1.500	1.000	1.500
16	New Zealand	2.50	13	3	4	1.333	0.625	0.833
17	Belgium	2.00	14	2	2	1.000	1.000	1.000
18	Czech Republic	2.00	14	2	2	1.000	1.000	1.000
19	Korea	2.00	14	3	3	1.000	0.667	0.667
20	Poland	2.00	14	2	3	1.500	0.667	1.000

Other countries represented: Argentina, Brazil, Burkina Faso, China (Hong Kong), Estonia, Israel, Kazakhstan, Norway, Slovenia, South Africa, Switzerland, Taiwan, United Arab Emirates.

The productivity metrics in table 5 associate each article and scholar with the institution where they were affiliated at the time of publication. Academics often teach outside their country of citizenship.

6. DISCUSSION

The top of the rankings offers no surprises and are broadly consistent with Sutter's (2011) findings—indeed, it would have

been more surprising if George Mason University had not been ranked first, and would have drawn suspicion to the validity of the methodology. Below approximately the top ten institutions in each list, these rankings reflect that Austrian scholars tend to work in isolation, and institutional positions in these rankings below the most elite level are largely due to the efforts of one or two individual scholars. An anomaly in these rankings may derive from the sampling period, with more prolific scholars being ranked lower because they started their careers toward the end of the 2000s, or ended toward the beginning. Many of the lower-ranked institutions in table 2 are teaching colleges where publishing is relatively less emphasized. Other institutions may also rank lower because many scholars focus on more mainstream outlets which are not represented here. This may be a bias created by institutional tenure, promotion, and reappointment policies aiming at accruing conventional prestige, but if successful, certainly cannot be criticized.

The geographic and institutional diversity is staggering. These findings particularly highlight the importance of central gatherings like the Society for the Development of Austrian Economics sessions of the Southern Economic Association, the Mises Institute's Austrian Economic Research Conference, the Public Choice Conference, and the Association for Private Enterprise Education meetings. Such forums offer essential feedback, support, and networking among Austrian scholars, but also contribute to constituting the Austrian school as a viable intellectual community. The role of these gatherings can be likened to medieval market towns, and together with the journals themselves make the Austrian school a republic of ideas.

One notable feature is the singular absence of overlap between the Austrian rankings provided here and any of the many mainstream rankings cited in section 3 above. Unhappily, the Austrian school remains largely a world unto itself.[5] Institutions which rank

[5] Sutter (2011) undertakes to examine the Austrian school's engagement with the rest of the profession. He finds that scholars who publish in in the Austrian journals also publish in mainstream journals, and that this tendency in no way diminished over the 2000–2009 period he examined. He found that Austrian scholars' publications in mainstream journals were cited more than publications in the *QJAE* or *RAE*. The motivation for his study was a suggestion that the mere existence of the

well by mainstream publishing criteria, either rank low, or do not appear at all in an Austrian ranking. The highest-ranked Austrian programs are not prominent in mainstream rankings, when they appear at all. Clearly Austrian and mainstream rankings measure different things, which are nearly mutually exclusive.

7. CONCLUSION

Clear trends are evident that research performance within the Austrian school is dominated by a small number of strong and increasingly vibrant graduate programs, particularly George Mason University, and the Ludwig von Mises Institute, a unique organization dedicated to advancing non-partisan libertarianism and Austrian economics. Further growth in the school will likely come from continued progress by these institutions and the growth of graduate programs, particularly at West Virginia University, Auburn, and Texas Tech. Troy University's Sorrell College of Business includes a large concentration of Austrian-influenced economists, houses the Manuel H. Johnson Center for Political Economy, and was recently approved for an M.A. program in economics.

Representation in the published research of the Austrian school beyond these core institutions is best typified by one or two relatively isolated researchers established at teaching institutions. For the foreseeable future, most graduates of Austrian doctoral programs will probably continue to locate at teaching, as opposed to research, institutions. Teaching institutions with Austrian scholars are well-positioned to enhance their reputations through research performance.

One limitation of these findings is that focusing solely on journal publication in established and exclusively Austrian journals, skews the rankings against prolific scholars whose output includes books and articles in non-Austrian journals. It should be noted that such publications are highly-valued and well-regarded within the Austrian school. The most productive researchers have produced,

Austrian journals resulted in an insularity and limitation of engagement with, and influence on, the mainstream. Although our influence on the mainstream may be less than what we would like, Sutter found it had not diminished.

and will continue to produce, scholarship reaching beyond the limitations of these rankings.

APPENDIX 1: OTHER SCHOLARS INCLUDED

Richard Adelstein
C.A. Aktipis
M. Amendola
William R. Anderson, Jr.
David Emanuel Andersson
Luciano Andreozzi
D.B. Audretsch
Mie Augier
Jose Augier
Laurent Augier
Robert L. Axtell
Roger E. Backhouse
Howard Baetjer
Charles W. Baird
Gerben Bakker
N.W. Balabkins
Zoran Balac
Tobias Basse
Robert Batemarco
William J. Baumol
Toby Baxendale
Scott A. Beaulier
M.C. Becker
Don Bellante
Timothy Besley
Marina Bianchi
Francis Bismans
John P. Bladel
Geoffrey Brennan
Michael Brooks
James M. Buchanan
Thomas Bundt
Per L. Bylund
Joseph Calandro, Jr.
Peter T. Calcagno
Bruce Caldwell
Stephen T. Call
Gilles Campagnolo
Jean-Paul Carvalho
D. Cassill
Andreas Chai
J.R. Clark
Greg Clydesdale
Jay Cochran III
David Colander
Carol M. Connell
Philip J. Cook
Roy E. Cordato
Alfons Cortes
Diana Costea
J. Dean Craig
Eric Crampton
Ricardo F. Crespo
Paul F. Cwick
Daniel J. D'Amico
Marius Dan
Gregory M. Dempster
D.J. Den Uyl
Pierre DesRochers
Marina Di Giacinto
Francesco Di Iorio
Pauline Dixon
Laurent Dobuzinskis
John A. Dove
Paul Aligica Dragos
Philippe Dulbecco
Nabamita Dutta
Peter E. Earl
Richard M. Ebeling
John B. Egger
Robert B. Ekelund
Peter Engelhard
Lucas M. Englehardt
Francois Facchini
Francesco Ferrante
Agnes Festre
Valerio Filoso
Steve Fleetwood
Fred E. Foldvary
Roger Nils Folsom
Mathew Forstater
Kirsten Foss
Abel Francois
Robert H. Frank
Doug French
David Friedman
Wayne J. Froman
J.L. Gaffard
Angel Rodriquez

Ryan Oprea
Randal O'Toole
Alexandre Padilla
Miia Parnaudeau
Giovanni Patriarca
Sandra J. Peart
Gary M. Pecquet
Svetozar Pejovich
Mark Pennington
Pierre Perrin
Steven E. Phelan
Richard A. Posner
Jason Potts
Christopher Prendergast
David L. Prychitko
Munir Quddus
Michel Quere
Lall Ramrattan
Jacques-Laurent Ravix
W. Duncan Reekie
Erik S. Reinert
Marie-Francoise Renard
Morgan O. Reynolds
G.B. Richardson
Harry W. Richardson
Salvatore Rizzello
Rory Rohan
Ronald L. Ross
Marina V. Rosser
Murray N. Rothbard
Sanjukta Roy
P. Rubin
Jochen Runde
Wilhelm Ruprecht
Frédéric Sautet
Nick Schandler
Dirk Schiereck
Stefan W. Schmitz
Jeremy T. Schwartz
John Sedgwick
George Selgin
Triyakshana Seshadri
Emily C. Shaeffer
Daniel Shapiro
Stephen Shemanske
Sudha Shenoy
Frank Shostak
Barry Dean Simpson
Andrea Sisto
Vernon L. Smith
Marcellus S. Snow
Nicholas A. Snow
Russell S. Sobel
E. Sober
Dennis A. Sperduto
Odd J. Stalebrink
Samuel R. Staley
Ian Steedman
Gennady Stolyarov II
Huei Chun Su
Daniel Sutter
R. Swedberg
Michael Szenberg
Thomas C. Taylor
Jerry H. Tempelman
Timothy D. Terrell
A.R. Thurik
Patrick Tinsley
Robert D. Tollison
James Tooley
H.A. Scott Trask
Werner Troesken
Gordon Tullock
Ludwig Van den Hauwe
Viktor J. Vanberg
Olav Velthuis
Martti Vihanto
Stefan Voigt
O. Volckart
Allan Walstad
A. Watkins
Tyler Watts
Lawrence H. White
Claudia R. Williamson
D.S. Wilson
Jakub Bozydar Wisniewski
Ulrich Witt
Stuart Wood
Thomas E. Woods
Steven Yates
Andrew T. Young
Tony Fu-Lai Yu
Milan Zafirovski
Leo Zaibert
Roberto Zanola
Gregor Zwirn
Todd Zywicki

APPENDIX 2: OTHER INSTITUTIONS INCLUDED

American Enterprise Institute

American University of Sharjah

Appalachian State University

Athens University of Economics and Business

Austrian Academy of Sciences

Autonomous University of Madrid

Babson College

Baldwin-Wallace College

Baylor University

Belhaven College

Bellarmine University

Ben-Gurion University of the Negev

Brooklyn College

Brown University

Buckeye Institute

Business School of Rouen

California State University East Bay

California State University Haywood

Cambridge University

Campbell University

Cardiff University

Carthage College

Central Michigan University

Centre National de la Recherche Scientifique

Charles University of Prague

Chonnam National University in Kwangju

Clemson University

College of Charleston

Columbia University

Columbus State University

Cornell University

Daegu University

DekaBank

Delaware State University

Denison University

Duke University

EHESS-CREA, École Polytechnique Paris

Emory University

Erasmus University

ESCEM School of Business and Management Tours

ESCP Europe Business School London

European School of Management London

European Business School Oestrich-Winkel

Fayetteville State University

Ferris State University

FHDW Hanover

Financial Sector Analysis, European Commission

Flagler College

Florida Institute of Technology

Franklin and Marshall College

GDV European Office

Georgia Perimeter College

Helsinki School of Economics

Heritage Foundation

Humboldt University

Illinois Wesleyan University

IMK Hans Beckler Foundation

Independent Institute

Indiana University

INRETS-DEST

Institute for Civil Society

Institute for Energy Research

John Hagel and Associates

John Locke Foundation

Johns Hopkins University

Kazakhstan Institute of Management and Economic Research

Kenyon College

Kreger Rohan Capital Management

LBBW

Leader University, Tainan, Taiwan

Lehigh University

LGT Capital Management

London Metropolitan University

Luis Guido Carli University

Maastricht University

Manchester Metropolitan University

Marymount College

Massey University

Max Planck Institute

Mercer University

Middlebury College

Mirant Americas

Mount Olive College

New Zealand Treasury

North Greenville College

Northern Michigan University

Northwestern University

Northwood University

Norwegian School of Economics and Business Administration NHH

Ohio Northern University

Ohio State University

Oklahoma City University

Ouagadougou University

Oxford University

Panteion University Athens

Prarie View AandM University

Ratio Institute

RMIT University Melbourne

Santa Clara University

Seafood Holdings Ltd

Simon Fraser University

Slovenian Ministry of Finance

St. John's University

St. Louis University

St. Louis University Madrid

Stanford University

Suffolk University

SUNY Binghamton

Texas AandM University

Texas Christian University

The Other Canon Foundation

The Rational Argumentator

The Thoreau Institute

Tilburg University

Towson University

Turku School of Economics and Business Administration

U.S. Census Bureau

U.S. Merchant Marine Academy

Universidade Federal de Santa Catarina, Florianópolis, Brazil

Universita degli studi di Cassino

Universita degli studi di Trento

Université d'Auvergne

Université de La Rochelle

Université de Nice Sophia Antipolis

Université de Paris I Panthéon-Sorbonne

Université de Paris II Panthéon-Assas

Université de Paris IX Dauphine

Université de Provence Aix-Marseilles

Université de Reims Champagne-Ardenne

Université Paul Cézanne Aix-Marseilles III

Université Paul Verlaine de Metz

University Austral and Conicet Buenos Aires

University of Canterbury New Zealand

University of Alberta

University of Birmingham

University of Bucharest

University of California Haywood

University of California Santa Cruz

University of Chicago

University of Colorado Boulder

University of Colorado Denver

University of Dallas

University of East Anglia

University of Eastern Piedmont

University of Economics, Prague
University of Exeter
University of Freiburg
University of Geneva
University of Georgia
University of Hawaii
University of Hong Kong
University of Illinois
University of Kassel
University of Lancaster
University of London King's College
University of London Queen Mary College
University of Maine
University of Mississippi
University of Missouri Columbia
University of Missouri Kansas City
University of Missouri St. Louis
University of Münster
University of Naples
University of New England
University of New South Wales
University of Newcastle
University of North Carolina at Greensboro
University of Oklahoma
University of Padua
University of Pennsylvania
University of Pittsburgh
University of Pittsburgh at Johnstown
University of Richmond
University of Rome
University of Sheffield
University of Siena
University of Soedertoern
University of South Alabama
University of South Carolina Union
University of South Carolina Upstate
University of South Florida
University of Southern California
University of Southern Queensland
University of Stirling
University of Tasmania
University of Tennessee Chattanooga
University of Texas Pan American
University of the Witwatersrand
University of Toronto at Mississauga
University of Uppsala
University of Wisconsin La Crosse
University of Wisconsin Parkside
University of Wroclaw
University of Wyoming
Vienna University of Economics and Business Administration
Wake Forest University
Walsh College
Warsaw University
Wesleyan University Connecticut
Wofford College
World Bank Institute
York University

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Book Review

Austrian Theory and Economic Organization: Reaching Beyond Free Market Boundaries

Guinevere Liberty Nell, Ed.
New York: Palgrave MacMillan, 2014, 256 pp.

Matthew McCaffrey

In her introduction to this collection, Guinevere Nell applauds Austrian scholars for their noteworthy contributions to economics. However, in her view, contemporary Austrians are too often motivated—and constrained—by the search for free-market conclusions, leading them to neglect both the problems of unregulated markets and the promise of alternative forms of organization. To remedy this myopia, Nell's book attempts to apply Austrian theory outside "free market boundaries."

Specifically, the essays collected here survey and revise Austrian theories of organization, and extend them in unconventional

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directions. Given the increasing importance of organization studies in the social sciences, the potential value of this kind of project is large, and several of the papers do live up to their aspirations. Unfortunately, however, the most ambitious chapters tend to suffer serious problems, especially in terms of due diligence.

Before explaining this assessment further, I should say a word about the framing of the book, which is explicitly intended as an antidote for perceived orthodoxy in economics. This motivation is not a problem as such; however, it does unintentionally put critics in a difficult position. Specifically, because the book offers an alternative to received wisdom, critical discussion of its content, especially in support of established Austrian theory, runs the risk of being dismissed as reactionary intolerance. However, while such reactionary writings certainly do exist, they do not mean serious criticism grounded in established Austrian theory is impossible. With that in mind, I now turn to several of the more significant contributions to this collection.

Randall Holcombe's essay on "Improving Spontaneous Orders" provides a foundation for the other chapters either to build on or to criticize. Holcombe provides a concise overview of spontaneous order, along with some advice about how and how not to tamper with it; in general, he suggests "bottom-up" methods, rather than a "top-down" approach. Specifically, "If one is looking for ways to improve spontaneous orders, a good place to start would be to look for ways to facilitate voluntary interaction and to prevent coercive and predatory interaction." (23) Overall, readers will find this essay a useful reference on the definitions and implications of planned and unplanned orders.

The same is true for Per Bylund's chapter, which deals with "The Firm and the Authority Relation: Hierarchy vs. Organization." Bylund pushes organizational theory forward by questioning whether firms can truly be defined by the authority relations within them. His answer is no; instead, Bylund draws on recent work in Austrian economics to argue that firms are market institutions that facilitate entrepreneurial innovation. (116) Authority is at most an incidental aspect of firm structure.

Caleb Miles and Edward Stringham's paper, "Eliminating the Perceived Legitimacy of the State," is also fundamentally about the

problem of order. Rather than firms, however, their chapter studies the emergence of law and coercive government institutions. Miles and Stringham argue, along Hayekian-evolutionary lines, that law emerges as the result of a long-term and often spontaneous process of rule-formation. Contrary to popular belief, states do not emerge as the result of a contract with the people, but through a combination of persuasion and force. Ideology is an especially important part of the persuasive process, as it plays a key role in legitimizing state activity. Consequently, changes in ideology—especially the recognition of non-state sources of order—help delegitimize the state.

One chapter likely to stimulate discussion is Kevin Carson's essay on "Economic Calculation Under Capitalist Central Planning." In it, Carson applies insights from the socialist calculation debate to the modern corporation and its internal organization. In particular, he argues that hierarchical forms of control are inherently bureaucratic, and experience the same calculational chaos that centrally-planned economies do (or, for that matter, that "one big firm" would). However, his essay extends the calculation argument further than Ludwig von Mises, F.A. Hayek, or Murray Rothbard would. According to Carson, the corporate form itself is a creation of state interference in the economy. In a genuinely free market, calculation problems would cause the disappearance of such hierarchical organizations altogether.

I am sympathetic to the substance of Carson's argument, which deserves more attention. Unfortunately, his chapter suffers from its own metaphorical calculation problem, with predictably similar results: its output is not directed toward clear goals, lacks an organized structure, makes inefficient use of resources, and is too large. I am not simply trying to be clever when I say this project would be more fruitful as a series of smaller, more focused papers, rather than "one big essay."

These stylistic issues contribute to a sometimes uneven discussion of economic calculation. For instance, the argument jumps from theoretical to empirical claims without clear transitions. The references are somewhat eclectic, and often draw on sources that are either outdated or out of place. The bibliography, for instance, ranges from the works of Oliver Williamson to science fiction novels. There are also several under-supported claims, including some assertions about corporate management

culture and how managers behave in practice. These claims may well be accurate, but they need to be grounded in more extensive evidence. Especially important, the paper lacks a clear definition of "hierarchy," which would be useful for separating entrepreneurial from bureaucratic decision making. Fortunately, Per Bylund's chapter explores this question in detail.

Whatever we make of Carson's essay, it is an earnest attempt to answer pressing questions in economics. I am not convinced the same can be said for some of the other chapters in this book. Take, for instance, Gus diZerega's chapter on "Contract, Freedom, and Flourishing." Before criticizing his essay, I should note that most of it is devoted to a genuinely intriguing discussion of worker cooperatives in Spain's Basque Country. These cooperatives illustrate the argument—made throughout the book—that horizontal forms of organization can perform just as well as, if not better than, hierarchical forms. A case study of this sort is a welcome complement to the rest of the chapters, which are mainly theoretical.

Regrettably, the bulk of the essay is crippled by its early sections, which try to motivate the discussion of cooperatives with a criticism of free-market economics and/or libertarianism. This framing device is almost completely unrelated to the empirical analysis that follows, and appears added as an afterthought. More importantly, its critical analysis runs into difficulties.

DiZerega's major claim is that "libertarians and other advocates of unregulated markets"—none of whom, incidentally, are ever identified—defend unrealistic theories of contract and property rights that only function at "high levels of abstraction." (123) The problem is that the conventional logic of choice does not describe real-world exchanges or contracts, because all of these involve important contextual elements:

> [E]very exchange… exists within a concrete context that combines their personal qualities with their historical situation in a certain society at a certain time. In addition, any given exchange occurs within a time frame where its results reflect the context in which it occurred and influence what comes next. (123)

Readers will likely be confused by this claim, especially because diZerega considers it a decisive criticism of free-market thought.

Yet who would deny it? Unsurprisingly, diZerega cites no sources arguing against his position; in fact, many economists have reasoned along similar lines. To take only one example, Ludwig von Mises discussed the importance of "context" at length in his description of economic history. In his view, even though there are universal properties of action, human beings need "specific understanding" of contextual information to fully describe concrete exchanges in the real world (Mises, 2007, esp. 264–284).

In any case, diZerega fails to show that free-market thought is committed to defining its terms in such a way as to eliminate "context." (130) Nevertheless, he goes on to argue that the notion of context undermines several important libertarian concepts, including self-ownership, voluntary contract, and coercion. Despite the fact that these issues have been debated for decades, he makes almost no reference to the literature. A notable exception is when he misrepresents the work of Mises and Rothbard by claiming that their theories did not—and could not—contribute to the analysis of human welfare:

> Sadly the increasing insistence on the impossibility for making "interpersonal comparisons of utility" prevented many Austrians from exploring this rich area of understanding. This was particularly true for Austrians seeking to develop a "praxeological" approach to economics.... If we take Mises and Rothbard's arguments seriously, praxeological economics has nothing at all to say about whether well-being is increased or decreased by any act of coercion or violence against *any* number of people. It is useless. (129)

The above passage indicates that diZerega has either not read the works he cites, or is uninterested in conveying their actual content (he mentions only *Human Action* and *Man, Economy, and State*: tellingly, without page numbers from either). In particular, any reader of Rothbard's works knows he not only used Misesian praxeology to develop a systematic approach to utility and welfare economics, but explicitly based this approach on the concepts of cooperation and coercion. Rothbard first elaborated his theory in a 1956 essay in honor of Mises (Rothbard, 1997), and later extended and applied it in *Man, Economy, and State*, which extensively references the original paper (*cf*. for example, Rothbard, 2004, 1061–1068). DiZerega's claim is therefore mistaken, whether we

accept Rothbard's theory or not. Furthermore, even if diZerega's criticism of praxeology were correct, it still would not show that praxeological theorems are false: it would only mean that economic theory has at least one limitation. Why would this limitation make praxeology "useless"? Is welfare the only subject about which economic theory should inform us?

Consider another example of questionable background research. According to diZerega, Mises supports an "all-too-common image of entrepreneurs as somehow radically different people than those who provide 'labor'" (136–137). DiZerega does not cite any of Mises's scholarly discussions of entrepreneurship to support this claim. Instead, he quotes one sentence from Mises's fan letter to Ayn Rand, which is ludicrously described as an "example from Austrian theory." It is no such thing, and diZerega knows it: it is an informal comment taken out of context by someone who apparently cannot be bothered to actually read what Mises has to say. To take another example, Mises actually wrote a lengthy essay on producer cooperatives (Mises, 1990). If diZerega wants to critique Mises, why not address this argument?

In any case, Mises's letter does not even say what diZerega wants it to. The relevant quote is as follows: "You [Rand] have the courage to tell the masses what no politician told them: you are inferior and all the improvements in your conditions which you simply take for granted you owe to the effort of men who are better than you." Out of context, this might appear damning. Yet Mises's meaning is explained by his next sentence, which diZerega does not quote: "If this be arrogance, as some of your critics observed, it still is the truth that had to be said *in this age of the Welfare State*" (Mises and Rothbard, 2007; emphasis added). In other words, Mises is contrasting wealth creation with wealth redistribution, and pointing out the superiority of the former. He is suggesting that entrepreneurs are "superior" in that they create value for consumers rather than redistribute it, as the welfare state does. Moreover, even if this were not Mises's intended meaning, the quote still fails to support diZerega's claim, because it says nothing about "entrepreneurs" as compared to "labor."

My previous two paragraphs devote more space to understanding Mises and free-market thought than diZerega's entire essay. Nevertheless, although I found parts of his chapter

frustrating, I emphasize again that I am discussing only the introductory sections. These contain such a large number of problematic claims and implications that criticism requires far more space than the original ideas. The chapter's framing thus detracts from what otherwise might have been an informative analysis of the cooperative movement.

The final two chapters of the book do the most to build on its central theme of "reaching beyond free market boundaries." These essays, by Andrew Cumbers and Guinevere Nell, respectively, each aspire to do more than simply emphasize decentralized, non-hierarchical forms of market organization in the private sector. Rather, they want to extend these organizational forms to the public sector as well, in an effort to create viable "post-Austrian" forms of market socialism.

The general thrust of each chapter is that free markets produce a number of social ills, including inequality and worker exploitation, and generally fail to provide social justice. A fairly aggressive program of government intervention and economic control is therefore required to solve these problems. At this point, Austrians might raise some conventional objections about the failings of central planning. However, according to Cumbers and Nell, such problems are not insurmountable: Hayek's criticism of central planning, while important, can be accounted for through innovative approaches to social and economic institutions. For instance, non-hierarchical, worker-owned cooperatives operating in competitive markets can solve knowledge problems without conventional private ownership of the means of production (although Cumbers believes this solution would grant too much power to markets). Market socialism gets the best of both worlds by effectively allocating resources *and* meeting the needs of the least advantaged people in society.

Let us assume, for the sake of argument, that this kind of criticism of Hayek is enough to undermine his case against planning (which is debatable). Even so, it is still insufficient to make the case for the possibility of a socialist economy, market or otherwise, because it ignores the *calculation* problem of socialism stressed repeatedly by Mises. As he observes, the impossibility of socialist calculation remains even if we assume that planners possess all relevant information about the availabilities, potential uses, and possible combinations of

resources, as well as the prevailing state of technology (Mises, 2000). Ultimately, economic calculation rests on ownership and the "entrepreneurial division of labor." Mises's approach therefore shows that Cumbers' criticism of market resource allocation—specifically, that markets are flawed because they are uncertain and imperfect conveyors of information—is irrelevant (189–190).

Sadly, Cumbers does not mention Mises at all, and Nell only hints that Mises had a distinctive view of central planning. Similarly, neither references the extensive literature building on Mises' work, which continues to shed new light on the problems of market socialism (Salerno, 1990a, 1990b, 1993; Machaj, 2007). This neglect, taken in light of Mises's still-relevant arguments, offers a good example of the usefulness of distinguishing between Mises and Hayek's critiques of socialism.

The last and most problematic essay in this collection is Guinevere Nell's "The Post-Austrian School and the New Market Socialism." This chapter is partly a synthesis of the others in the book, but also extends their arguments in order to further criticize Austrian theory and propose a market socialist alternative. Unfortunately, Nell's arguments do not live up to their ambitions.

Nell bases her discussion of market socialism on the assertion that Austrians often turn a blind eye to public goods and collective action problems, especially when they threaten preconceived free-market conclusions (197–198). Needless to say, she never provides evidence for this assertion, nor could she, given the enormous number of Austrians writings on these subjects; in fact, her own discussion of Austrian critiques of public goods contradicts the claim that Austrians ignore them (199–201). Ultimately, she manages to summon only a few scattered references to the Austrian literature, including non-academic works. She does, however, cite several critiques of Austrian theory, suggesting that they contain more extensive arguments. Yet readers are usually left in the dark about what these criticisms actually entail (in addition, some seemingly-important references are not listed in the bibliography). The pattern just described, of unsupported assertion, self-contradiction, and vague referencing is repeated throughout the chapter.

Cumbers and Nell each insist that some form of market socialism is necessary because free markets produce a number of important social

ills, including the exploitation of labor and the environment, and wealth inequalities. As evidence, they appeal to general and specific historical examples. However, their evidence persistently highlights the failings, not of free markets, but of government intervention. The most egregious example is Nell's claim that markets can promote discrimination (202–203). As anecdotal support, she discusses a US restaurant that was obliged by neighboring businesses to stop serving food to the needy. In her view, this is a clear example of cultural values driving business to make discriminatory and unjust decisions in the pursuit of profit. However, she goes on to acknowledge that it was not the neighboring businesses, but the *police* who enforced the discriminatory bullying! Nell even observes that such bullying is usually institutionalized through legislation, yet she fails to see this undermines her narrative about *market* discrimination, and actually supports the case for unregulated markets. Her criticism eventually descends into self-parody when she hints that Austrian economists, because of their single-minded focus on the importance of markets, willfully ignore the historical slave trade (204).

In addition to the alleged costs of markets, Nell sets her sights on their benefits as well. She aims high, asking whether markets were the true source of the enormous wealth creation of recent centuries (203). In her view, economists cannot claim economic growth as a victory for markets, because technological and scientific development played important roles as well. As it turns out, this argument has already been addressed by economic historians (McCloskey, 2010, 153–160, 355–365). Scientific and technological advances do contribute to human welfare, but only when entrepreneurs introduce them to markets—it is markets that make innovations accessible to the masses rather than simply to a handful of elites. However, Nell suggests that the causation can be reversed: wealth increases came first, and trade followed after. Critics might reasonably respond by asking how wealth could have grown to any significant extent without trade.

These kinds of straightforward objections are frequently overlooked. Another example concerns Rothbard's distinction between *coercion* and *refusal to engage in trade*, which happens to be the lynchpin of his critique of Hayek (Rothbard, 1998, 219–229). Nell remarks that Rothbard's definition of coercion is flawed because it does not take into account the loss of freedom individuals

experience when their options are limited by forces other than physical aggression. This criticism, however, is the reason Rothbard proposes the above distinction to begin with: according to him, alternate definitions of coercion lead to confusion and contradiction. As before, one does not have to agree with him to see that this argument needs to be at least mentioned.

The same is true for Rothbard's approach to welfare economics, which also comes under fire. In Nell's opinion, the demonstrated preference approach to utility implies, for instance, that homeless people must prefer to live on the streets (226). It seems not to have occurred to her that homelessness might not be an example of preference, but of coercion. Specifically, homelessness is often caused by rent controls, zoning restrictions, failed public housing projects, the effective criminalization of homelessness, and other public measures that make it impossible to find a stable place to live.

Ultimately, however, Nell's argument against free markets and in favor of market socialism rests on the assumption that Austrians do not and cannot endorse any kind of means for allocating resources other than profit-seeking market exchange (228). This claim is simply baffling, and Nell produces no evidence to support it. More significant though is her definition of market socialism: what "makes one a "market socialist"" is the willingness to discuss, "possible ways to support cooperatives, start-ups, nonprofits, and spontaneous order *democratic* solutions" (228; emphasis in original). By this account, practically everyone is a market socialist; moreover, Nell sees no irony in the fact that this assumption and definition appear shortly after her claim that it is the Austrians who conveniently define terms to fit a chosen narrative.

In general, Nell argues that public ownership, when combined with democratic decision making processes and alternative forms of organization (e.g. cooperatives), will produce viable market socialism. In this system, conventional objections to planning are no longer relevant:

> In short, assumptions about self-interest underlie much of economic analysis. But what if voters are capable of voting for the true common good instead of for their own pet projects? What if "bureaucrats" were to be true "civil servants" and representatives were to care about doing what is right, rather than about their personal payoff? This could result in the collapse of much of "public choice" economics and of Austrian analysis. (225)

Charles Fourier would be proud: no wonder Marx yearned for scientific socialism. Nell could just as easily suggest that, "if the universe operated on entirely different principles than it does, and if everything we have learned about human decision making and institutions were false, this could result in the collapse of much of "public choice" economics and of Austrian analysis." In addition, as far as Mises's theory is concerned, Nell's claim is inaccurate. As mentioned above, the impossibility of calculation does not depend on assumptions about central planners' self-interested behavior, or about their knowledge or preferences. It would still exist even under new forms of market socialism, and it will take more than solemnly intoning "cooperatives" and "democracy" to show otherwise.

Several confusions and mischaracterizations come together in Nell's conclusion, where she appears to endorse each of the following claims simultaneously: real-world economies are in fact free markets; real-world economies are in fact corporatist; Austrians believe real-world economies are free markets; Austrians believe real-world economies are corporatist; Austrians ignore the problems of real-world free-market economies; Austrians criticize the problems of real-world corporatist economies. Using these ideas as a foundation, Nell arrives at the astounding conclusion that, because Austrians embrace the economic status quo (which they do not), they should also endorse market socialism, because contemporary economies are close to market socialism already!

After devoting so much space to criticism, I would like to close by suggesting a positive way forward for Austrian organizational theory. A recurring theme throughout this review is the idea that Mises's contributions deserve further study, and in fact, that they are most neglected in fields where they are most relevant. With that in mind, I encourage economists to renew their focus on Mises's work, which has much to say about problems in entrepreneurship, organization, and economic systems. This endorsement does not imply that we can never add to his efforts; still, Mises's ideas were not only path-breaking in their own time, but continue to inspire a vibrant research agenda, and for that reason, are worth returning to. In any case, researchers hoping to outline workable forms of market socialism cannot avoid challenging Mises's views. Then again, if the essays in this book are any indication, Austrian economics can rest easy.

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Book Review

Patent Trolls: Predatory Litigation and the Smothering of Innovation

William J. Watkins, Jr.
Oakland: The Independent Institute, 2013, 79 pp.

Audrey D. Kline

It wouldn't be a stretch to compare patent trolls to the playground bully, initiating scare tactics to gain control and in the case of the trolls, revenue. Following Bill Shughart's informative foreword, William Watkins packs a good amount of information into his book about patent trolls. Watkins begins by giving the reader a brief history of patent law, explaining how trolls operate, outlines problems with the current laws and court system, as well as providing some recommendations for reform. The focal points of the book are not only the trolls themselves but also the incredibly plaintiff (troll)-friendly U.S. District Court in Eastern Texas.

At the outset, Watkins provides an informative history lesson on patent law, tracing the concept of patents back to the 1400s and

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the medieval guilds in Venice and other cities. British Parliament reformed patent law in 1623 due to abuse by Elizabeth I, and set a fourteen-year exclusive right of production to the "true and first inventor" (p. 4). The United States followed suit with the Constitution of 1787, providing exclusive rights but the codification of patent law in the U.S. arrived three years later with the U.S. Patent Act of 1790. The Act required, among other things, a full description of the invention in exchange for the fourteen-year exclusive right to utilize the invention (p. 5). Further revision to the Patent Act came in 1952, extending patents to a twenty-year term. The primary industry seeking the longer patent term was the pharmaceutical industry, which faced a long time horizon to recover its R&D investments due to the expense and time required for FDA approval through clinical trials.

Over the past several decades, the number of patents filed has seen explosive growth, only to be examined by fewer examiners at the US Patent & Trade Office (USPTO). According to the Patent Act, violation of a patent is a strict liability tort, meaning that damages can be awarded even if the offending violation was unintentional. As a result, the system has been viewed as biased toward the plaintiff. This has opened the door for the rent-seeking activities of patent trolls, which are typically a non-practicing entity (NPE), which obtains a patent on typically old, broad-based software and computer technologies in the hopes of filing suit later against some entity utilizing the technology (p. 8). Trolls typically have no intention of ever operating in the industry. Rather, they seek to profit simply by owning the patent.

Interestingly, Watkins notes that trolls will often opt for "protection money rather than jury verdicts," (p. 13). Though Watkins doesn't make the explicit connection, this seems to be a tactic not far flung from the Sicilian Mafia. Be it the troll or the mob, the threat of greater harm, whether it is a large jury verdict for the troll or physical harm imposed by the mafia, either circumstance tends to lead the target toward opting for a settlement or "protection money." While Watkins paints a very strong case against trolls, he does also take the time to point out some of the supposed benefits of trolls according to the supporters, including helping the small inventors and businesses that do not have the resources to take on the likes of Google, Apple, or Microsoft for patent infringement (Watkins later illustrates the fallacy of this proposition). Moreover,

trolls have property rights to the patents they own and as such, are simply protecting their property rights. A 2011 study by Boston University researchers suggests patent infringement cases brought by trolls have resulted in losses exceeding $83 billion annually from 2007 through October 2010 (p. 17).

As is the case with all rent-seeking activities, resources are being wasted in the legal system to capture revenue from the troll's targets through either settlements or infringement lawsuits. And the trolls are skilled at their craft, erecting puppet LLC's and aligning with local charities to play on the sympathies of jurors. It's not so hard to win a verdict against a big corporation like Apple when some of the award will be diverted to charitable causes locally. This has been the tactic in the Eastern District of Texas, which hears the most patent troll cases in the country and has historically sided with the plaintiff in an overwhelming fashion. Nearly 25 percent of all patent cases are heard in the Eastern District of Texas, with nearly 80 percent of the cases yielding a plaintiff verdict, compared to a national average of nearly 60 percent (p. 29). Watkins says the attraction to the Eastern District is the result of a combination of factors, including the lack of large corporate presence, a largely uneducated jury pool, and an older, less technologically savvy population. Moreover, this district tends to be quick with its cases, has the lowest rate of summary judgment motions in the U.S., and has judges experienced with patent law. As a result, plaintiffs prefer to file in this District, given the historical odds are in their favor for a jury trial with a positive outcome for the plaintiff (pp. 29–31).

Watkins provides a nice summary overview of a sampling of cases heard in the Eastern District of Texas from 2002 through 2010. A few cases presented are actually won by the defendant, but the majority are victories for the trolls. A common theme runs through them—that of the bully seeking rents in the form of fees, settlements, or royalty payments or having the defendant run the risk of a much larger injury at the hands of a jury unlikely to understand the nuances of the patent itself and patent law. In some cases summarized by Watkins, several large corporations entered into settlement agreements to avoid trial, while one firm rode the case out only to be handed a very expensive judgment, as well as incurring significant legal fees. In a few instances, the trolls were found to have invalid patents and lost their case.

Several suggestions for reform are offered in the book in chapter 8. One of the most intriguing is to shorten the length of the patent for software companies to a five year instead of twenty year patent. The argument rests on the nature of the industry. Pharmaceutical companies do need a longer patent window to recover their R&D expenses. The software industry, however, moves at such a rapid pace that most software is irrelevant in five years (p. 50). As such, adjusting the length of the patent to more closely match the nature of the industry such as in software would allow the inventor to capture their profit share while concurrently eliminating the likelihood of patent trolls being able to capitalize on old patents to hold firms hostage for payouts or jury verdicts. Other recommendations include allowing easier transfer across court districts to reduce the plaintiff's ability to "shop" for a friendly court. This would require plaintiffs to demonstrate they are filing in the proper venue, particularly if it is outside their locale (p. 51). A third interesting concept is to have patent cases heard by professional or specialized juries (p. 52). This would better ensure that the jury understands the cases being tried before them since they would be skilled and knowledgeable in the area being tried for patent infringement. Use of an international industry requirement rather than the ITC domestic industry requirement would require patent trolls to be active in the industry to be permitted to bring a patent infringement suit forward (pp. 51–53). This would prevent trolls from simply buying patents with no intention to ever operate in the industry. Finally, we could take a lesson from Europe. European patent law does not issue patents for computer programs, mathematical methods, business methods, and the like. As such, it is much more difficult to have a broad-based patent infringement claim. Further, the European Patent Office (EPO) allows anonymity in patent cases, which lessens the threat of retaliation for challenging a patent. Importantly, it is also significantly less expensive to file for a patent review, with the USPTO charging at least $100,000 and the EPO cost being roughly 20 percent of that expense (p. 57).

Watkins closes by calling on Congress to change the rules for corporate residence, inviting the Federal Circuit to revisit how it establishes personal jurisdiction, and again calls upon Congress to investigate creating a special patent court system with professional jurors. A modernized court system, according to Watkins, would

greatly reduce the (rent-seeking) behavior of trolls, reduce the incidence of litigation, and would restore the incentive to innovate back to the forefront for U.S. businesses, a key component for economic growth.