BLACK MARKET RATES AND OFFICIAL RATES IN ARMENIA: EVIDENCE FROM CAUSALITY TESTS IN ALTERNATIVE REGIMES

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INTRODUCTION

The goal of this paper is to investigate the causal relationships between the Armenian official and black markets for the U.S. dollar, which is the dominant currency of Armenia’s transactions with the trading partners [Annual Reports, 1994; 1995; 1996; 1997], from 1993 to 1997. Three sub-periods are investigated. From November 1993 to May 1994, the Granger causality test shows that black market rates unilaterally cause the official rates, while from June 1994 to October 1994, a bilateral causality relationship is present. Finally, from November 1994 to January 1997, Granger causality appears to run from the official rate to the black market rate.

The paper is organized as follows. After describing the background and history of foreign exchange regimes in Armenia, the next section presents the relationship of foreign exchange markets with the Armenian economy in aggregate. In the third section, Granger causality tests are presented in an effort to test certain exchange rate relationships. The last section provides some concluding comments.

A black market fully operated in Armenia from the day that an official rate of the domestic currency (the Armenian dram) became available in November 1993 until November 1994, the date when the Armenian central bank undertook full control over the operations of the foreign exchange market transactions. At that time the majority of black market activities were abolished. The workings of the black market were fueled by the presence of strict controls in the foreign exchange market and by the needs of importers to obtain foreign exchange. The presence of foreign exchange controls contributed to excess demand for foreign exchange and a strong incentive for a black market to emerge.

The Armenian foreign exchange market has been characterized by three important sub-periods: first (from November 1993 to April 1994) the central bank held low amounts of foreign reserves and lacked credibility to effectively control foreign exchange transactions. Potential traders were prohibited from obtaining foreign exchange, since the amount of foreign reserves was very limited. As a result, excess...
demand for foreign exchange occurred, which drove black market rates far above free market rates (Figure 1). In May 1994 the Armenian central bank removed certain foreign exchange controls by giving, on the basis of comprehensive evaluations of bank activities, internal and general licenses to commercial banks to make auctions in the foreign exchange market. At the same time, it limited black market activities.

The commercial banks became more independent in pursuing their own commercial policies, including foreign exchange transactions. Since then, the central bank has been responsible for auditing the commercial banks' activities in the foreign exchange market [Annual Report, 1994].

During the second sub-period (May 1994 to October 1994), the central bank was striving to stabilize the entire banking system, through high capital requirements, strong solvency and required reserve (liquidity) ratios, increases in minimum reserve ratios on foreign currency deposits, reductions in "insider loans" from a bank to shareholders, improvements in bank reporting and monitoring, and new approaches to on-site supervision.

In addition, the central bank, in its attempt to manage the official exchange rate — in a crawling peg exchange rate system — tried to further increase its holdings of foreign reserves by (1) attracting foreign currency deposits and servicing foreign currency transactions through the banking system, (2) establishing a surrender requirement of 50 percent of all foreign exchange earnings to the central bank (half of all foreign earnings, primarily U.S. dollars, had to be exchanged for drams), and (3) forcing the commercial banks to open positions for their own foreign exchange reserves by selling a portion of their foreign exchange reserves to the central bank [Annual Reports, 1994; 1995]. At the same time, official foreign exchange reserves were supported by loans received from the IMF and the World Bank for structural adjustments in the economy.

The central bank influenced the exchange rate in the domestic foreign exchange market by selling foreign reserves for drams. This reduced the growth of the money supply, whose previous growth had had an inflationary impact on the economy. This intervention policy was efficiently exercised through the auction system initiated by the participation of the central bank, the commercial banks, and the private sector. For instance, the demand for foreign exchange by the private sector could be met by cash interventions through the commercial banking system. At the same time, the exchange rate policy maintained a relatively stable price level for imported goods, resulting in lower inflation due to a decreasing impact of imported inflation on domestic inflation.

In November 1994, further deregulation actions contributed to a stabilized foreign exchange market. Such deregulation actions involved:

- The establishment by the central bank of an interbank credit market that encouraged efficiency in the private banking sector.
- The establishment of the legislative framework to facilitate currency transactions (for example, a minimum size for foreign exchange reserve requirements).
- An expansion of the arrays of transactions facilitated by banks in foreign currencies.
- The freedom of authorized banks to open and operate correspondent accounts in foreign banks rather than in the central bank.
- The freedom of residents and nonresidents to convert drams into foreign currency without documentation or limit.
- The freedom of the foreign banks to participate in foreign exchange transactions.
- The elimination of all restrictions on capital inflows.
- The abolition of all restrictions on the inflow to Armenia of foreign currency and other assets, (for example, securities, expressed in foreign currency) [Annual Report, 1995].

The consequences of such deregulated actions characterized the beginning of the third sub-period under investigation (November 1994 to January 1997) with the following consequences for the Armenian economy:

First, the ability of the central bank to implement an efficient exchange rate policy was enhanced, through the acquisition of large foreign exchange reserves to be used to stabilize the dram against the dollar. More specifically, the official exchange rate helped the central bank to effectively participate in the foreign exchange market in order to curb the inflationary pressures that again developed in the domestic economy. To this end, the central bank implemented strong foreign exchange interventions [Annual Report, 1997]. As a result, the role of the official exchange rate increased tremendously and the difference between the black market and the official rate narrowed significantly (Figure 1). The difference, however, remained until March 1997, because certain restrictions on bank activities, (i.e. large foreign exchange reserve
requirements), remained valid. Moreover, inflation exhibited a substantial increase in late 1995 and in early 1997 (from 7 percent to 21.9 percent) due to increases in indirect taxes, the monetization of the budget deficit, lower economic growth rates, and increases in prices in agricultural markets. These developments motivated importers and others to buy dollars on the black market. (The central bank did not support such transactions through the official currency rate [Annual Reports 1996; 1997].)

Second, the presence of an official foreign exchange market provided internal convertibility of the dram. It also allowed the liberalization of licensing, in terms of conducting free transactions in foreign exchange (over 1,000 such agents were in operation by the end of 1995), as well as the elimination of most of the remaining restrictions in current and capital account transactions.

Third, the foreign exchange became an investment medium, given the lack of a well-functioning stock market in Armenia.1

The presence of two parallel markets over the three alternative phases of the Armenian foreign exchange market raises questions concerning the nature of the relationship between these two markets as well as the implications of such a relationship for the Armenian economy. Some information regarding the behavior of a black market for economies in transition or in the process of economic stabilization seems to be needed. The objective of currency reforms in developing economies is the unification of exchange rates and the eventual convertibility. One of the issues needing elaboration is how to determine the appropriate exchange rate that will enable developing economies, such as Armenia, to smoothly integrate to the capitalist trading system. Certain studies in the relevant literature have pointed out that black market rates cannot be used as a benchmark for exchange rate policies in these economies (Lipton and Sachs, 1990; Charemza, 1990).

Therefore, the goal of this paper is to investigate the causal relationship between the Armenian official and black markets for the U.S. dollar, which is the dominant currency of Armenia’s transactions with the trading partners (Annual Reports 1994; 1995; 1996; 1997). Hypotheses concerning the direction of causality between the black markets and the official markets have been developed by Dornbusch et al. (1983) and Olgun (1984) who developed models of black market exchange rate determination in conjunction with the central bank’s efforts for managing a country’s official rate. Observed black market premia could be simply transitory phenomena, reflecting just intertemporal speculation and asset market clearing conditions. In other words, the presence of such black market premia could be misleading indicators of misalignment in a developing economy. Thus, the relationship between official and black market rates could add to the skepticism about the success or failure as voiced in Motsiel and Osty (1994) and Fry (1998). It also seems crucial to know whether it is the black market or the official rate that determines equilibrium conditions in the money market (Bahmani-Oskooee, 1996). Furthermore, the relationship between the black market and the official rate in a developing economy is needed to assess any real effects generated by a currency depreciation. Kamin (1995) has argued that the stronger is the presence of a black market, the smaller are the real effects of an official depreciation. Finally, Phylaktis (1992) has argued that the market that eventually prevails is extremely important to the monetary authorities when formulating policy on foreign exchange restrictions.

The rest of the paper is organized as follows. In the next section, exchange rate relationships in the Armenian economy are presented. In the third section, Granger causality tests are presented in an effort to test certain exchange rate relationships. The last section provides some concluding comments.

EXCHANGE RATE RELATIONSHIPS IN ARMENIA

Over the first sub-period, changes in the black market exchange rate are expected to 'Granger-cause' changes in the official rate. According to the efficiency hypothesis in black markets (Gupta, 1983; Culperton, 1989; El-Solhka and McNabb, 1994), this finding implies that participants in the black market are capable of anticipating changes in the official rate. The Armenian economy has been confronted by high rates of inflation. Inflation, although it showed a dramatic decline from 1720 percent in 1990 to 7 percent annually in 1995, has played (along with inflationary expectations) a dominant role in the central bank’s decisions to set the 'appropriate' official rate in such a way as to reflect changes in expected inflation. Since inflation has played a dominant role in the central bank’s decisions, price expectations should be the link between the two rates (Kevos and Seidert, 1986).

Dornbusch et al. (1983), Phillips (1986), and Culperton (1989) have provided evidence that the black market determines the official rate through the black market premium hypothesis. According to this hypothesis, the black market current account is determined by the black market premium (defined as the difference between the black market rate and the official rate) and the real exchange rate. More specifically, any unexpected depreciation tends to reduce the premium, leading to a current account surplus in the black market, which, in turn, reduces the supply of "black market foreign exchange." In other words, changes in the black market premium generate portfolio disequilibrium changes that reflect changes in the stock of "black market foreign exchange." Under the hypothesis that participants in the foreign exchange market anticipate a depreciation of the official rate (say, due to anticipated higher inflation and stronger inflationary expectations) the premium as well as the black market rate will increase. If that the depreciation occurs, and the black market rate determines the official rate (Kamin, 1993). An alternative (and complementary) explanation, raised by a referee, could be that the black market rate was merely more forward-looking than the more slowly adjusting official rate. Thus, in response to upicks in inflation, the black market rate is the first that adjusts, followed later by the official rate.

The central bank in an effort: (i) to attract investors who could invest in the Armenian economy, (ii) to maintain a rather stable official exchange rate, in the sense that exports do not become overpriced nor imports underpriced, and (iii) to maintain purchasing power parity, has consistently intervened in the foreign exchange market in order to provide the necessary adjustments in the official exchange rate and to determine the desired exchange rate between the dram and the U.S. dollar.
### Table 1

**Unit Root Tests**

<table>
<thead>
<tr>
<th>Levels</th>
<th>Variable without trend - with trend</th>
<th>First Differences</th>
<th>Without trend - with trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phillips-Perron (c) tests</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I. 1985:11-1994:4 &lt;br&gt; or</td>
<td>-2.6124</td>
<td>-2.6960</td>
<td>-5.5249&lt;sup&gt;8&lt;/sup&gt;</td>
</tr>
<tr>
<td>br</td>
<td>-2.6841</td>
<td>-2.6940</td>
<td>-5.0210&lt;sup&gt;8&lt;/sup&gt;</td>
</tr>
<tr>
<td>II. 1994:5-1994:10 &lt;br&gt; or</td>
<td>-2.6124</td>
<td>-1.6291</td>
<td>-15.0495&lt;sup&gt;8&lt;/sup&gt;</td>
</tr>
<tr>
<td>br</td>
<td>-1.6941</td>
<td>-1.6940</td>
<td>-14.0210&lt;sup&gt;8&lt;/sup&gt;</td>
</tr>
<tr>
<td>III. 1994:11-1997:1 &lt;br&gt; or</td>
<td>-11.2410&lt;sup&gt;8&lt;/sup&gt;</td>
<td>-12.9945&lt;sup&gt;8&lt;/sup&gt;</td>
<td>-12.6919&lt;sup&gt;8&lt;/sup&gt;</td>
</tr>
<tr>
<td>br</td>
<td>-16.4110&lt;sup&gt;8&lt;/sup&gt;</td>
<td>-19.0430&lt;sup&gt;8&lt;/sup&gt;</td>
<td>-19.0430&lt;sup&gt;8&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

**KPSS tests**

| I. 1985:11-1994:4 U = integer(477/100) = 4 | 2.552<sup>8</sup> | 0.4773<sup>9</sup> | 0.0281 | 0.0344 |
| br | 2.5554<sup>8</sup> | 0.4651<sup>9</sup> | 0.0255 | 0.0294 |
| II. 1994:5-1994:10 U = integer(77/100) = 7 | 2.258<sup>8</sup> | 0.5998<sup>8</sup> | 0.0127 | 0.0083 |
| br | 2.2793<sup>8</sup> | 0.6123<sup>8</sup> | 0.0221 | 0.0221 |
| III. 1994:11-1997:1 U = integer(477/100) = 4 | 0.0946 | 0.0347 | 0.0246 | 0.0246 |

Critical values for T and 1 in the KPSS tests were obtained from Kwiatkowski et al. [1992].

* Denotes significance at 5 percent.

Over the second sub-period, no clear-cut findings are expected, since this period has been characterized as a transition period. Over the third sub-period, following the decline in inflation and the attempt of the central bank to depreciate the exchange rate that led to a cessation of capital flights as well as to a reduction in the excess demand for foreign exchange (U.S. dollars), the official rate is expected to Granger-cause the black market rate. It is worth mentioning at this point that in the beginning of this period the Armenian economy experienced excess liquidity, resulting from higher inflows of capital to the country (i.e. an indication that the country was gaining the confidence of the foreign economic system, which led to an appreciated drams). However, the central bank activated foreign exchange interventions first to absorb any excess liquidity from the markets merely by using those interventions as a monetary policy instrument, and second to eliminate any appreciation of the domestic currency.

### Table 2

**Granger Causality Tests**

<table>
<thead>
<tr>
<th>Dependent Variables</th>
<th>I. 1990:11-1994:4</th>
<th>( \Delta \sigma )</th>
<th>( \Delta \sigma )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Lags</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>( \Delta \sigma )</td>
<td>0.45</td>
<td>0.46</td>
<td></td>
</tr>
<tr>
<td>( \Delta \sigma )</td>
<td>0.0018</td>
<td>0.0022</td>
<td></td>
</tr>
<tr>
<td>( \Delta \sigma )</td>
<td>0.61(0.63)</td>
<td>0.72(0.38)</td>
<td></td>
</tr>
<tr>
<td>( \Delta \sigma )</td>
<td>0.01(0.90)</td>
<td>0.04(0.84)</td>
<td></td>
</tr>
<tr>
<td>( \Delta \sigma )</td>
<td>0.75(0.67)</td>
<td>0.24(0.97)</td>
<td></td>
</tr>
<tr>
<td>Tested Restriction</td>
<td>Logged ( \Delta \sigma ) do</td>
<td>Logged ( \Delta \sigma ) do not</td>
<td></td>
</tr>
<tr>
<td>( \Delta \sigma )</td>
<td>10.29</td>
<td>0.48</td>
<td></td>
</tr>
<tr>
<td>( \Delta \sigma )</td>
<td>0.60</td>
<td>0.63</td>
<td></td>
</tr>
</tbody>
</table>

| Maximum Lags | 5 | 5 |
| \( \Delta \sigma \) | 0.68 | 0.43 |
| \( \Delta \sigma \) | 0.0014 | 0.0014 |
| \( \Delta \sigma \) | 0.74(0.99) | 0.01(0.94) |
| \( \Delta \sigma \) | 1.79(0.74) | 0.31(0.66) |
| \( \Delta \sigma \) | 0.86(1.55) | 0.85(1.56) |
| \( \Delta \sigma \) | 0.28(0.97) | 0.85(0.71) |
| Tested Restriction | Logged \( \Delta \sigma \) do | Logged \( \Delta \sigma \) do |
| \( \Delta \sigma \) | 10.29 | 0.48 |
| \( \Delta \sigma \) | 0.60 | 0.63 |

The definitions of the LM, KRSET, and HS are provided in the text. Figures in brackets denote p-values.

### Data

The empirical analysis is carried out using weekly data for both the official ex-

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The table above shows the results of unit root tests and Granger causality tests for the Armenia Economy. The tables include tests for levels and first differences, with and without trend. The significance of the tests is indicated by critical values and p-values. The empirical analysis shows the relationship between the variables over different sub-periods, highlighting the impact of the central bank's interventions and changes in the economy's liquidity and confidence in foreign economic systems.
change rate (OR) and the black market exchange rate (BR) from November 1993 through January 1997. Both exchange rates are defined as units of the Armenian dram per U.S. dollar. Since the United States is the primary currency in Armenia’s foreign commercial transactions, the analysis will be held in terms of the exchange value of the dram with respect to the U.S. dollar. Data were made available by the Research Department of the Bank of Armenia.2

Integration Analysis

We test for unit root non-stationarity by using the tests proposed by Phillips [1987] and Phillips and Perron [1988]. The results are reported in Table 1. The hypothesis of a unit root was not rejected for both series in levels at the 5 percent significance level and over the first two sub-periods. By contrast, over the third period unit root non-stationarity was rejected in the levels of both series. When first differences were used, unit root nonstationarity was rejected for both series and over the first two sub-periods. However, both the first and the second regime under study involve a small number of observations, which might make the unit root results invalid. Shiller and Per- ron [1985] argue that the power of the Phillips-Perron tests depends on the span of the data rather than the number of observations. Therefore, in order to test the robustness of the integration results, KPS test unit root tests, developed by Kwiatkowski et al. [1992], have been also examined, and are reported in Table 1. The test examines the null hypothesis of stationarity and it takes into account serial correlation by using a Bartlett window. The lag truncation parameter is set equal to \( t = \left[ \frac{4T^{1/2}(1.96)}{T} \right] \), where \( T \) is the number of observations and \( [x] \) means “integer part of.” For the empirical purposes of this paper, over the first and the second regime \( t = 2 \), while over the third regime \( t = 4 \). The results recommend that the hypothesis of stationarity is rejected for both series in levels at 5 percent over the first two periods, while it is accepted over the third period. When first differences were used for the first two periods, unit root stationarity was accepted.

Overall, the two series over the two first periods exhibit the problem of stochastic trends and the Engle-Granger [1987] theorem could be used to investigate the possible existence of a long-run relationship. However, the cointegration methodology assumes data covering long time periods. Hakko and Bush [1991], Lahiri and Mamingi [1995], and Hu [1996] argue that it is a long time span and not the number of observations that improves the power of cointegration tests. Therefore, we follow only a short- run approach.

Short-Run (Granger) Causality Tests

Table 2 reports the results of the Granger causality tests. In the first sub-period, standard F-tests reveal that changes in the black market rate do Granger-cause changes in the official rate. In other words, \( \Delta v_r \) does have information content for \( \Delta v_o \), implying that the black market rate could be used as an indicator to predict future movements in the official rate. By contrast, the official rate appears not to Granger-cause the black market rate. The statistical specification of the Granger cau-

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CONCLUDING COMMENTS

This paper has attempted to investigate the relationship between the official and the black market rate in the Armenian foreign exchange market by using weekly data from 1993 to 1997. Three sub-periods were investigated. From November 1993 through May 1994 black market rates seem to have unilaterally caused the official rates, while from June 1994 through October 1994 a bilateral causality relationship seems to be present. Finally, from November 1994 through January 1997, Granger- causality appears to run from the official rate to the black market rate. The last finding indicates the enhanced capacity of the monetary authorities to set the official rate independently and the inability of black market dealers to lead foreign exchange rate movements.

The capability of the official market to lead the black market in the third sub-period indicates the successful attempts by the central bank to utilize the exchange rate policy to raise the credibility of its economic policy (Pinto, 1991). Furthermore, the stabilization of the exchange rate market allowed the maintenance of a relatively stable price level for imported goods, effectively reducing the pressure of imported inflation on domestic prices and increasing the confidence in the dram. Nevertheless, Khuras and Pinto (1989) have pointed out that in the unification era a credible fiscal package is mandatory to compensate for the loss of any revenues generated in the black market (giving domestic residents the chance to avoid the inflation tax). Without the presence of such a credible fiscal package, high inflation pressures are expected to emerge. This remains to be investigated in the future.

NOTES

The author would like to thank, without implicating, Dr. Pasyanvje Hatzianahav, two anonymous referees and the editor of this Journal for helpful comments and suggestions on an earlier draft. Needless to say, the usual disclaimer applies.

1. The manufacturing sector in Armenia produces mainly non-competitive (high-priced and low-quality) consumer goods, which strongly encourages imports. Moreover, privatization is still an uncommon feature of the Armenian economy. Only a small part of the public manufacturing industries have been privatized, resulting in the absence of a well-functioning black market.

2. The Microfit software assisted the empirical analysis, while lower case letters denote variables expressed in logarithms, (i.e., \( \Delta t \) and \( T \), respectively).
REFERENCES


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JOB SEARCH STRATEGIES AND OUTCOMES FOR ACADEMIC ECONOMISTS: A MIDDLE-MARKET VIEW

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Of all the markets that we study, economists have an inherent interest in the one in which we participate. Yet new Ph.D. economists typically enter this market with little preparation for their first job search. Several recent studies and annual reports can better prepare sellers (and buyers) who participate in the market for academic economists. For example, average salaries for new assistant professors can be found in the AEAs Universal Academic Questionnaire (UAQ) (1999). Also, Siegfried and Stock (1999) report that the recent weak academic market has forced some aspiring professors into business and industry. Besides providing information on what current applicants might expect, their study is also of use to those advising prospective graduate students.

Other resources focus on gender differences in the market. The Committee on the Status of Women in the Economics Profession (CSWEP) provides an information network to assist women with their job search. Other studies reveal gender differences in search activity and outcomes. For example, Forbush et al. (1989) and Siegfried and Stock (1999) find that women can expect entry-level salary offers comparable to those made to men. However, women are more likely to accept offers at liberal arts colleges rather than in top-ranked departments or in schools of business (Barbezat, 1992). Women can also expect slower progress toward tenure (Kohn, 1990) and a widening wage gap as their careers develop (Broder, 1989). Finally, every seller can benefit from Carson and Navarro’s (1988) survey of buyers, which outlines the steps in the screening process and ranks the evaluative criteria used by employers.

Results from our recent survey of sellers contribute to this body of research by providing information on job search strategies and outcomes for those in (or anticipating entry into) the market for academic economists. Since our sample is based on a survey of those who applied for a position at a typical middle-tier school, our results are most applicable to those anticipating a similar experience. With this in mind, our