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**ZIMBABWE HYPERINFLATES,
AGAIN: THE 58TH EPISODE OF
HYPERINFLATION IN HISTORY**

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Johns Hopkins Institute for Applied Economics,
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Zimbabwe Hyperinflates, Again: The 58th Episode of Hyperinflation in History

By Steve H. Hanke and Erik Bostrom

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About the Series

The Studies in Applied Economics series is under the general direction of Prof. Steve H. Hanke, Co-Director of The Johns Hopkins Institute for Applied Economics, Global Health, and the Study of Business Enterprise (hanke@jhu.edu).

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In the past, Prof. Hanke taught economics at the Colorado School of Mines and at the University of California, Berkeley. He served as a Member of the Governor's Council of Economic Advisers in Maryland in 1976-77, as a Senior Economist on President Reagan's Council of Economic Advisers in 1981-82, and as a Senior Advisor to the Joint Economic Committee of the U.S. Congress in 1984-88. Prof. Hanke served as a State Counselor to both the Republic of Lithuania in 1994-96 and the Republic of Montenegro in 1999-2003. He was also an Advisor to the Presidents of Bulgaria in 1997-2002, Venezuela in 1995-96, and Indonesia in 1998. He played an important role in establishing new currency regimes in Argentina, Estonia, Bulgaria, Bosnia-Herzegovina, Ecuador, Lithuania, and Montenegro. Prof. Hanke has also held senior appointments in the governments of many other countries, including Albania, Kazakhstan, the United Arab Emirates, and Yugoslavia.

Prof. Hanke has been awarded honorary doctorate degrees by the Bulgarian Academy of Sciences, the Universität Liechtenstein, the Universidad San Francisco de Quito, the Free University of Tbilisi, Istanbul Kültür University, and Varna Free University in recognition of his

scholarship on exchange-rate regimes. He is a Distinguished Associate of the International Atlantic Economic Society, a Distinguished Professor at the Universitas Pelita Harapan in Jakarta, Indonesia, a Professor Asociado (the highest honor awarded to international experts of acknowledged competence) at the Universidad del Azuay in Cuenca, Ecuador, and a Profesor Visitante at the Universidad Peruana de Ciencias Aplicadas (the UPC's highest academic honor). In 1998, he was named one of the twenty-five most influential people in the world by World Trade Magazine.

Prof. Hanke is a well-known currency and commodity trader. Currently, he serves as a member of the Supervisory Board of Advanced Metallurgical Group N.V. in Amsterdam and Chairman Emeritus of the Friedberg Mercantile Group, Inc. in Toronto. During the 1990s, he served as President of Toronto Trust Argentina in Buenos Aires, the world's best-performing emerging market mutual fund in 1995.

Prof. Hanke's most recent books are *Zimbabwe: Hyperinflation to Growth* (2008), *A Blueprint for a Safe, Sound Georgian Lari* (2010), *Juntas Monetarias para Paises en Desarrollo* (2015), and *Currency Boards for Developing Countries: A Handbook* (2015).

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Introduction

In 2008, Zimbabwe suffered the second most severe episode of hyperinflation in recorded history (Hanke and Krus, 2013). As shown in the table below, Zimbabwe's annual inflation rate peaked in November 2008, reaching 89.7 sextillion (10^{21}) percent (Hanke and Kwok, 2009). Prices were doubling every 24.7 hours.

Well, Zimbabwe is experiencing hyperinflation again today. Zimbabwe's annual inflation rate is currently at 313 percent.

During Zimbabwe's hyperinflation episode (2007-2008), the Reserve Bank of Zimbabwe failed to report any meaningful economic data, including inflation rates. One of us (Hanke), assisted by a capable research team at The Johns Hopkins University, was the only source of accurate inflation rate measurements during that hyperinflation episode.

ZIMBABWE'S HYPERINFLATION

Date	Month-over-month inflation rate (%)	Year-over-year inflation rate (%)
March 2007	50.54	2,200.20
April 2007	100.70	3,713.90
May 2007	55.40	4,530.00
June 2007	86.20	7,251.10
July 2007	31.60	7,634.80
August 2007	11.80	6,592.80
September 2007	38.70	7,982.10
October 2007	135.62	14,840.65
November 2007	131.42	26,470.78
December 2007	240.06	66,212.30
January 2008	120.83	100,580.16
February 2008	125.86	164,900.29
March 2008	281.29	417,823.13
April 2008	212.54	650,599.00
May 2008	433.40	2,233,713.43
June 2008	839.30	11,268,758.90
July 2008	2,600.24	231,150,888.87
August 2008	3,190.00	9,690,000,000.00
September 2008	12,400.00	471,000,000,000.00
October 2008	690,000,000.00	3,840,000,000,000,000.00
14 November 2008	79,600,000,000.00	89,700,000,000,000,000,000.00

NOTES: The Reserve Bank of Zimbabwe reported inflation rates for March 2007–July 2008. The authors calculated rates for August 2008–14 November 2008.
SOURCES: Reserve Bank of Zimbabwe (2008a) and authors' calculations.

On Measuring Zimbabwe's Hyperinflation

Just how was Zimbabwe's 2007-2008 inflation rate accurately measured? During episodes of hyperinflation, the only reliable and feasible way to measure the inflation rate is via the application of Purchasing Power Parity (PPP). To do that, one needs data on the most important price in the economy: the exchange rate between the domestic currency and a stable international currency. This was not feasible in Zimbabwe. The Zimbabwe dollar was not traded on an organized exchange that reported exchange rates. Moreover, there were multiple black-market (read: free market) exchange rates for cash, as well as non-cash Zimbabwe dollars (i.e., credit and debit cards, checks, and bank transfers). Accordingly, the use of black-market exchange rates was not feasible either.

Due to the lack of the standard data required, it appeared that the measurement of Zimbabwe's inflation rate would not be feasible. However, the organized stock market in Harare did provide prices that allowed Hanke and Kwok (2009) to calculate implied Zimbabwe dollar exchange rates. One stock—that of the insurance and investment company Old Mutual—was, and still is, listed on both the London Stock Exchange and the Zimbabwe Stock Exchange. Each share of Old Mutual commands the same claim on the company's earnings and assets, irrespective of the market it is traded on. The only difference between Old Mutual shares traded on different exchanges was that the shares traded in London were denominated in British pounds sterling; whereas, those shares traded in Harare were denominated in Zimbabwe dollars. Therefore, given arbitrage and PPP, the ratio of the Old Mutual share price in Harare to that in London equaled the Zimbabwe dollar/sterling exchange rate.

To convert the resulting Zimbabwe dollar/sterling exchange rate to a Zimbabwe dollar/U.S. dollar rate, Hanke and Kwok (2009) multiplied the Zimbabwe dollar/sterling rate by the sterling/U.S. dollar rate, creating what is known as the Old Mutual Implied Rate (OMIR). By using the OMIR as an exchange rate between Zimbabwe dollars and USD, PPP was then applied as the final link necessary for calculating inflation rates.

So, does PPP hold during periods of hyperinflation? There is a consensus among economists that, over relatively short periods of time and at relatively low inflation rates, the link between exchange rates and price levels is loose. But, as inflation rates increase, that link becomes tighter. In a study of the German hyperinflation during the 1921–1923 period, Jacob Frenkel (1976) found that correlations between various German price indices and the German mark/U.S. dollar exchange rate were all very close to one. Accordingly, a one percent increase in the exchange rate was associated with a one percent increase in the price level. Frenkel's empirical work confirms that PPP holds when a country is undergoing hyperinflation. Additional evidence supporting the PPP principle during periods of both very high inflation and hyperinflation has also been reported for a wide range of other countries. (see McNown and Wallace 1989, Phylastis 1992, Mahdave and Zhou 1994, Zhou 1997, and Bleaney 1998).

That PPP holds under conditions of very high inflation and hyperinflation should not be surprising. After all, under these conditions, the temporal dimension of price arbitrage is compressed, and the long run effectively becomes the short run. For example, back in July 2008, Zimbabwe's monthly inflation rate was 2,600 percent—equivalent to a 12 percent daily inflation rate. That is, per day—not per month, nor per year. Under these circumstances, arbitrage

benefits per unit of time are relatively large, and transaction costs can be overcome quickly. In consequence, price arbitrage works to ensure that PPP holds.

When PPP holds, the ratio of the price levels between two countries is equal to the exchange rate between their currencies. Accordingly, changes in the exchange rate and the ratio of the price levels move in lock-step with one another, where the linkage between the exchange rate and price level is maintained by price arbitrage.

To determine the PPP for Zimbabwe relative to the United States, let P_{ZIM} = the Zimbabwe price level in "Zimbabwe dollars" (ZWD), let P_{US} = the United States price level in U.S. dollars (USD), and let $E_{ZWD/USD}$ = the Zimbabwe dollar/U.S. dollar exchange rate (ZWD per unit of USD).

Then, in a static sense, PPP states that:

$$\frac{P_{ZIM}}{P_{US}} = E_{ZWD/USD}$$

In a dynamic sense, PPP can be interpreted by looking at both changes in price levels and values of currencies over time. This relative form of PPP is expressed as:

$$\frac{1 + \frac{\Delta P_{ZIM}}{P_{ZIM}}}{1 + \frac{\Delta P_{US}}{P_{US}}} = 1 + \frac{\Delta E_{ZWD/USD}}{E_{ZWD/USD}}$$

Applying this relative form of PPP, the accurate measurement for Zimbabwe's inflation rate in the 2007-2008 period was made possible (see the Table on pg.3). As the rate of inflation accelerated, so did currency substitution. Zimbabweans exchanged their Zimbabwe dollars like

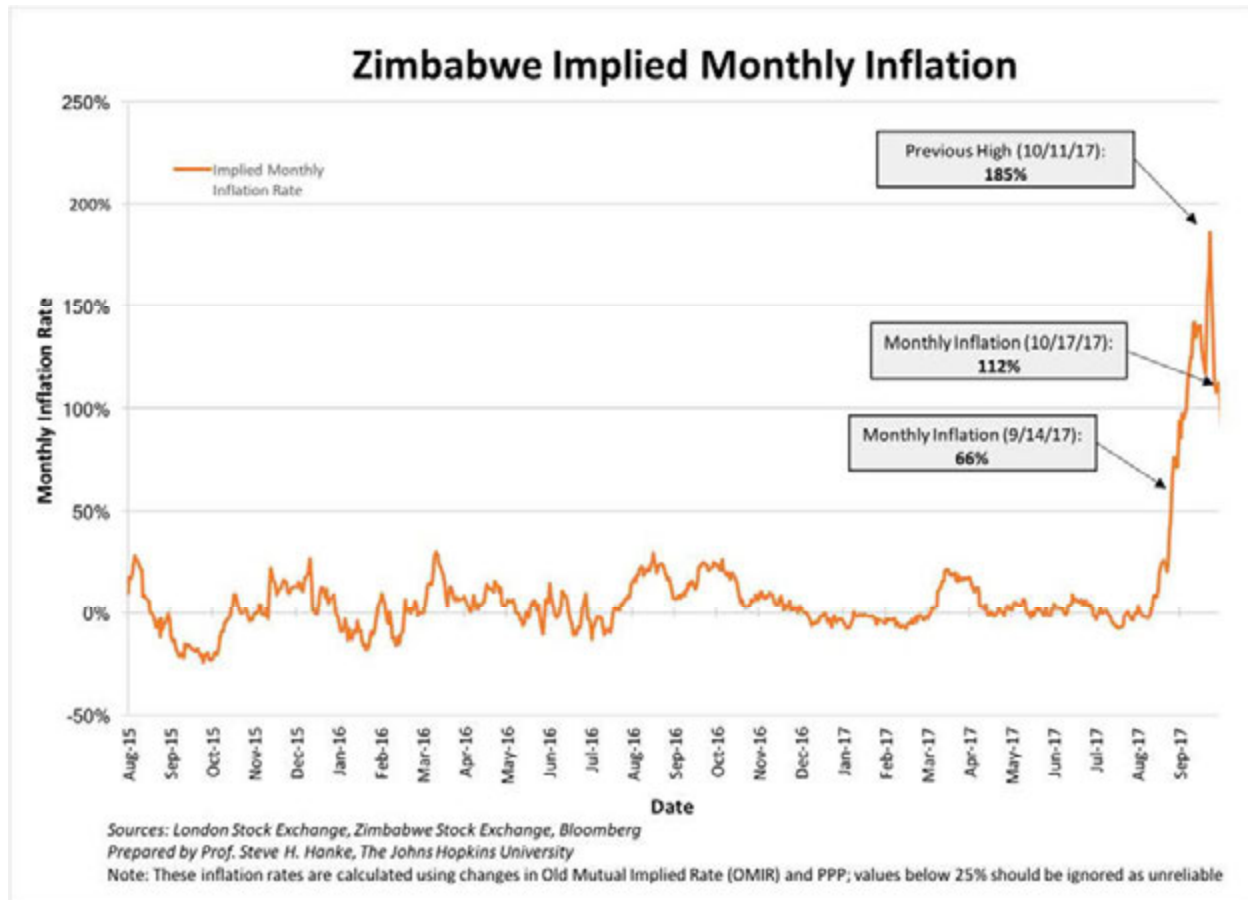
hot potatoes for U.S. dollars. As a result, Zimbabwe was spontaneously and unofficially dollarized. In the end, when prices were doubling each day in November 2008, Zimbabweans simply refused to use the Zimbabwe dollar. This forced the government's hand. As a result, the government adopted a multicurrency system based on foreign currencies. The U.S. dollar became the coin of the realm. Indeed, all government accounts became denominated in U.S. dollars in early 2009. As a result of this official dollarization and the installation of a new national unity government in 2009, the economy rebounded and international trust in Zimbabwe began to be restored.

Zimbabwe's Inflation Rate Today

Zimbabwe's period of stability was short lived. When President Robert Mugabe's party, ZANU-PF, regained control in 2013, government spending and public debt surged, resulting in economic instability. To finance its deficits, the government created a "New Zim dollar" (Hanke, July 2017). The New Zim dollar is issued at par to the U.S. dollar, but trades at a significant discount to the U.S. dollar. The money supply, as a result of the issuance of the New Zim dollar, exploded in Zimbabwe, and so has the inflation rate.

Just how do we know that Zimbabwe's inflation rate has skyrocketed? We know by employing the same theory and method of measurement used by Hanke and Kwok (2009).

Using the implied exchange rate (the Old Mutual Implied Rate), we are once again able to apply Purchasing Power Parity (PPP) to calculate an accurate measurement of Zimbabwe's inflation rate.**



Zimbabwe is now experiencing hyperinflation for the second time in less than ten years.

Hyperinflation occurs when the monthly inflation rate reaches 50 percent per month and remains

** It should be noted that Old Mutual is heavily traded on the Zimbabwe Stock Exchange (ZSE). Old Mutual accounted for 7.84 percent of the total value on the ZSE in September 2017. (Total trade value equals volume of shares traded multiplied by closing stock price for each day). To put this into context, the Bank of America, which was the most heavily traded stock by value on the New York Stock Exchange (NYSE) in September 2017, only accounted for 1.36 percent of the total trade value on the NYSE. In addition, it should be noted that, when the September trade values of Old Mutual and Bank of America are expressed as a fraction of Zimbabwe's and the U.S.'s GDP for 2016, their magnitudes are similar, with Old Mutual's at 0.04 percent and Bank of America's at 0.05 percent.

Also, it should be noted that the unit of account used on the ZSE is the electronic real time gross settlements (RTGS) unit, and that these comprise the bulk of the government's New Zim dollar liabilities.

above that rate for at least 30 consecutive days. This initial threshold was breached on September 14, 2017, and has remained above this rate as of today, October 17, 2017 (see chart above). Thus, Zimbabwe is in the throes of an ignominious hyperinflation in which the monthly rate of inflation is 112 percent and the annual rate is 313 percent, as of October 17, 2017.

The government statistics, which are notoriously unreliable, indicate that the annual inflation rate is 0.78 percent (Herald, 2017). Readers can forget this truly fantastical piece of artwork. They can also forget the International Monetary Fund's (IMF) Zimbabwe inflation rate predictions. In its most recent forecast, which is contained in the October 2017 *World Economic Outlook*, the IMF predicts only modest inflation for Zimbabwe. Both the government of Zimbabwe and the IMF are way wide of the mark, if not delusional, when it comes to Zimbabwe's inflation rate. Indeed, unlike the IMF, we measure inflation rates, we do not predict inflation rates. And today, Zimbabwe is experiencing hyperinflation with its current monthly inflation rate at 112 percent, and its annual inflation rate at 313 percent.

Zimbabwe and The Hanke-Krus World Hyperinflation Table

Just where does Zimbabwe fit into the world's hyperinflation picture? The Hanke-Krus World Hyperinflation Table puts Zimbabwe's hyperinflation episodes into perspective. The Table first appeared in the authoritative *Routledge Handbook of Major Events in Economic History* (Parker and Whaples, 2013). The Table contained every country that had experienced hyperinflation – 56 in total. Since its original publication, the Table was first amended in December 2016 to include Venezuela as the 57th entry (Hanke and Bushnell, 2017). With this paper, we amend the Table once again, adding a 58th entry: Zimbabwe's 2017 episode of

hyperinflation. On October 13, 2017, Zimbabwe met all the criteria to qualify as an episode of hyperinflation. Specifically, Zimbabwe's monthly inflation rate exceeded 50 percent per month for 30 consecutive days.

What was the genesis of the Hanke-Krus World Hyperinflation Table? What are the criteria required for a country to qualify for the hyperinflation designation? What is the standard method for measuring elevated inflation rates in countries? And how is this method used to measure Zimbabwe's inflation rates? These are the main questions we sought to answer.

In 2010, Hanke was invited to write the survey article on hyperinflation for *The Routledge Handbook of Major Events in Economic History*. Hanke accepted the invitation, thinking it would require routine work on his part and that he could complete the task in short order. He had already surveyed the literature on hyperinflation and had accurately estimated the inflation rates in several countries that had experienced hyperinflation. These included two relatively recent, dramatic episodes of hyperinflation – Yugoslavia (Hanke, 1999) and Zimbabwe (Hanke and Kwok, 2009). In addition, he had designed and implemented currency reforms that had stopped episodes of hyperinflation, notably Bulgaria's episode in 1997 (Hanke, 2016).

While reflecting on the existing literature of hyperinflation, Hanke was struck by the lack of uniformity and clarity. The literature written was widely scattered in time and space; it had been written by many different researchers, and those researchers had employed diverse methods to estimate and analyze the inflation episodes studied.

So, Hanke concluded that the best way to “clean up” the subject of hyperinflation was to create a “World Hyperinflation Table.” In his mind, this Table would include all recorded episodes of hyperinflation. The data would be presented in a uniform and clear manner, so that all

episodes of hyperinflation could be compared. But, what criteria would be used for an episode of inflation to qualify as hyperinflation? Hanke specified the following three criteria:

1. Following Phillip Cagan's 1956 classic article on hyperinflation, the economics profession adopted the following criterion: to qualify as an episode of hyperinflation, the inflation rate had to be at least 50 percent per month. Hanke adopted this convention.
2. In addition, Hanke specified that this 50 percent rate had to persist for at least 30 consecutive days.
3. Lastly, Hanke mandated that the inflation episode had to be fully documented and that inflation rate estimates had to be replicable.

It turned out that the third criterion was the most difficult one to satisfy. Fortunately, Hanke's chief research assistant at the time, Nicholas Krus, was capable and interested in taking on this research task. Hanke and Krus spent the better part of two years constructing what has come to be known as the Hanke-Krus World Hyperinflation Table. They documented and recalculated the inflation rates for all alleged episodes of hyperinflation in history. The project required the gathering of primary data for each potential case of hyperinflation. This proved to be very difficult and time consuming. For example, the primary data for the French hyperinflation episode of 1795 to 1796 – the first verified case of hyperinflation – had to be obtained and analyzed. But, that was not the most difficult set of data to gather. That "award" went to the

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Zimbabwe Stock Exchange : Daily Price Sheet. Zimbabwe Stock Exchange, <http://www.zse.co.zw/daily-price-sheet/>

Hanke-Krus World Hyperinflation Table Notes and Sources

- When a country experiences periods of hyperinflation that are broken up by 12 or more consecutive months with a monthly inflation rate below 50%, the periods are defined as separate episodes of hyperinflation.²

- The currency listed in the chart is the one that, in a particular location, is associated with the highest monthly rate of inflation. The currency may not have been the only one that was in circulation, in that location, during the episode.

- We are aware of one other likely case of hyperinflation: North Korea. We reached this conclusion after calculating inflation rates using data from the foreign exchange black market, and also by observing changes in the price of rice. Based on our estimates, this episode of hyperinflation most likely occurred from December 2009 to mid- January 2011. Using black-market exchange-rate data, and calculations based on purchasing power parity, we determined that the North Korean hyperinflation peaked in early March 2010, with a monthly rate of 496%

(implying a 6.13% daily inflation rate and a price-doubling time of 11.8 days). When we used rice price data, we calculated the peak month to be mid-January 2010, with a monthly rate of 348% (implying a 5.12% daily inflation rate and a price-doubling time of 14.1 days). All of these data were obtained August 13, 2012 from Daily NK, an online newspaper that focuses on issues relating to North Korea (<http://www.dailynk.com/english/market.php>). We also acknowledge that our investigation was aided by reports from Good Friends USA, a Korean-American advocacy and research organization, as well as from Marcus Noland at the Peterson Institute for International Economics.

(*) The authors calculated Zimbabwe's inflation rate, using changes in the price of the stock, Old Mutual, which was traded both on the Harare and London stock exchanges. The stock prices yielded an implied exchange rate for Zimbabwe dollars, under purchasing power parity.

(†) The Republika Srpska is a Serb-majority, semi-autonomous entity within Bosnia and Herzegovina. From 1992 until early 1994, the National Bank of Republika Srpska issued its own unique currency, the Republika Srpska dinar. (‡) Greece's inflation rate was estimated by calculating the drachma / gold sovereign exchange rate.

(§) The peak monthly inflation rate listed for China in the Table differs from that presented in one of the authors' previous pieces on hyperinflation (Hanke and Kwok, 2009). This revision is based on new data from a number of sources, which were recently obtained from the Library of Congress in Washington, D.C.

(**) We calculated the Free City of Danzig's inflation rate using German inflation data, since the German papiermark was in circulation in Danzig during this time. It is worth noting that Germany and Danzig experienced different peak months of hyperinflation. This is the case because the last full month in which the German papiermark circulated in the Free City of Danzig was September 1923. Germany continued to circulate the papiermark beyond this point, and subsequently experienced its peak month of hyperinflation (October 1923).

(††) The data for many of the post-Soviet countries were only available in the World Bank's Statistical Handbook: States of the Former USSR. In this publication, the authors stated that the data should be viewed with an extra degree of caution because the statistics were taken from the corresponding official internal government source and not independently reviewed by the World Bank. However, these statistics are official and are the only source of data available for the corresponding time periods for each country.☐

(***) We calculated PPP implied inflation for Venezuela using black-market exchange rate data from dolartoday.com.

(****) The authors calculated Zimbabwe's inflation rate, using changes in the price of the stock, Old Mutual, which was traded both on the Harare and London stock exchanges. The stock prices yielded an implied exchange rate for "New Zim dollars", under purchasing power parity.

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