Amity Business Journal
2014, Vol. 3, No. 2

Copyright 2014 by ABS,
Amity University Uttar Pradesh, Lucknow Campus (ISSN 2278-0904)

The J-Curve and Kulkarni Hypotheses: Evidence from Transition and Developing Economies

Michelle Woodruff* **Kishore G. Kulkarni****

The impact of currency devaluations on balance of trade deficits is a critical economic understanding for policy makers, especially those in the developing world. While intuitive logic leads to the conclusion that a depreciation or devaluation of currency will lead to balance of trade surplus by increasing exports and decreasing imports, real world conditions of low elasticities of demand mean that this effect is often delayed in a J Curve pattern. Repeated devaluations can in fact lead to persistent and dynamic deficit on the balance of trade, as identified by the Kulkarni Hypothesis. The goal of this paper is to identify any J Curve and persistent deficits as a result of currency devaluation in transition and developing countries with both fixed and floating exchange rate systems. After consideration of the theoretical framework as well as past academic work on the topic, this paper examines the balance of payments of the Czech Republic, Estonia, Morocco, and Kenya. Broadly speaking, all countries examined are determined to display some degree of support for the J-Curve and Kulkarni hypotheses, with some variation as a result of country specific discrepancies in exchange rate determination, stage of development, and composition of economy.

Introduction

Persistent balance of trade deficits continually feature in newspaper articles and economic debates as policy makers and analysts struggle to effectively address them. Prevailing theory suggests the quick fix of devaluing currency or allowing it to depreciate in order to stimulate exports through lowered prices while simultaneously discouraging excessive imports as they become increasingly expensive. This fundamental shift in balance of trade should lead to a correction of the trade deficit. Such an explanation, however, fails to account for the nuances of demand and may thus be misleading to policy makers.

In order to better understand the behavior of balance of trade in response to currency devaluations, Alfred Marshall and Abba Lerner developed a theoretical model describing elasticities of demand for exported and imported goods following currency devaluation. The Marshall Lerner Condition states that given certain assumptions, if elasticity of demand for imports and exports in relation to exchange rate is not sufficiently high, devaluation of currency will initially create a deficit on the balance of trade. Put more simply, if demand for exports does not increase sufficiently to compensate for the lowered price, the Marshall Lerner condition is not met and demand for imports does not decrease sufficiently to compensate for the increased price, the country will face an initial deficit on the balance of trade.

Taking time as a primary determinant for demand elasticities, this condition will consistently change as countries alter their behavior to reflect the new exchange rate. After an undefined period of time, the elasticities increase sufficiently to meet the Marshall-Lerner condition, at which pointa surplus on the balance of trade is achieved. Depicted on a graph, this relationship resembles theJ from which the theory draws its name. In order to account for the real world conditions, Kishore Kulkarni in 1994 posited that successive devaluations would result in shifting of the J curve, leading to "dynamic, persistent balance of trade deficits." Such devaluations prevent the Marshall-Lerner condition from being satisfied and instead maintain low elasticities in demand for imports and exports.

Neither of these conclusions precludes devaluation of currency as an effective policy tool to combat balance of trade deficits. Rather, they call for the awareness of the time component involved in making such policy decisions. As such, this paper will examine the effects of successive currency

* *Graduate Student, Korbel School of International Studies, University of Denver, 2201 South Gaylord Street, Denver, CO 80208. E-mail: Michelle.woodruff@du.edu*

** *Distinguished Professor of Economics and Editor, IJEB, CB 77, P. O. Box 173362, Metropolitan State University of Denver, Denver, CO 80217-3362. E-mail: kulkarnk@msudenver.edu*

devaluations in 4 countries which have undergone different types of devaluation and development. The first section of this paper will treat the theory with greater detail and review relevant literature on the J Curve. The second section will examine the relation between exchange rate and balance of trade in two transition economies of the former Soviet Union and two developing economies of North Africa during roughly the same time period in order to better understand the expression of the J Curve and Kulkarni hypothesis under different conditions. Attention will be given to the structure of each economy and the regime under which the devaluations took place to assist in explaining divergences from the expected patterns.

Explanation of Theory

Balance of Trade and Exchange Rate

The accounting system by which a country's international transactions are recorded is referred to as the Balance of Payments. In the Balance of Payments, there are three types of international transactions of interest: imports or exports of goods and services (the current account), purchase or sale of financial assets (financial account), and transfers of certain other assets between countries (capital account) (Krugman and Obstfeld, 2009). In practice, these last two accounts have historically been combined. For the purposes of this discussion, the net transfers of goods and services, referred to as the balance of trade, or current account, is the most relevant. On the current account, all exports and imports of goods and services to foreigners are recorded. If the value of goods and services imported is greater than the value of those exported, the current account is said to be in deficit, and if the opposite is true, it is said to be in surplus. In this way, the current account measures the size and direction of international borrowing.

Within the current account, the volume of goods imported is primarily dependent upon national income, expressed by GDP. As GDP increases, a country shows a tendency to import more goods. The amount by which imports increase per each increase in national income is termed marginal propensity to import. If small increases in GDP lead to large increases in imports (a high marginal propensity to import), the relationship is said to be highly elastic. However, a certain level of imports is independent from GDP and taken to be a constant, referred to as autonomous imports. The relationship between GDP and imports is expressed as follows:

$$M = M_0 + M_1 Y,$$

where M represents imports, M0 represents autonomous imports, M1 represents the marginal propensity to import, and Y represents GDP. Conversely, the volume of goods exported is primarily dependent upon foreign national income and is thus autonomous from the home economy.

However, to analyze flows on the current account, the effects of the exchange rate must be thoroughly understood. Let us define the exchange rate for the purposes of this paper as the number of domestic currency units per unit of foreign currency (eg 1.30USD = 1EUR), using the American method. With this method of expressing exchange rate, an increase on the exchange rate indicates a loss of value for the domestic currency as compared to the dollar. This exchange rate can either be determined in a fixed or a floating system, or some combination of the two. In general, developed nations tend to establish a floating exchange rate system whereas developing nations maintain a fixed exchange rate.

In a fixed exchange rate regime, a government pegs, or "fixes" the value of its currency to another currency or grouping of currencies.Common currencies to which domestic currencies are pegged include the euro and the US dollar. In a floating exchange rate system, the value of a currency is determined on the open market as actors engage in international transactions, creating supply and demand for currencies.There are several varieties of each system recognized by the International Monetary Fund, which further distinguishes between a country's official or de jure exchange rate regime, and their actual, or de facto arrangement. According to IMF standards, a government which maintains a fixed system may choose to maintain their currency in a narrow margin, or horizontal band, of a fixed central exchange rate. It may also choose to periodically adjust the currency at a fixed rate in response to factors such as inflation, referred to as crawling peg system. Floating exchange regimes may show some degree of direct or indirect government intervention to influence the exchange rate without having a specific target or path for the exchange rate.

Fixed exchange regimes tend to establish their exchange rate below the equilibrium rate in order to

increase the value of their currency. In this case, the price of their exports is artificially increased and the price of imports is cheapened, leading to a deficit on the current account. According to traditional theory, increasing the exchange rate and thus devaluing the currency will correct this deficit by directing domestic purchases to nontraded goods and services which will now be cheaper than imported goods and services, as well as increasing foreign demand for exports as prices in foreign currency fall (Cooper, 1971).

The J-Curve Hypothesis and the Marshall Lerner Condition

The J-Curve Hypothesis closely examines the effects of devaluation on the balance of trade. While conventional theory as described predicts a balance of trade surplus following currency devaluation, J curve theoryposits that if elasticity of demand for exports and elasticity of demand for imports are not sufficiently high, devaluation may lead to an initial deficit in the balance of trade. Put simply, this means that if an increase in exchange rate does not have a large impact on the demand for imports and exports, there will not be an adequate increase in exports to compensate for the lowered price of imports. Conversely, there may also not be a sufficient fall in imports to compensate for their increased price. Thus, the balance of trade will be in deficit, at least temporarily.

Alfred Marshall and Abba Lerner provide a technical description for this phenomenon in a model contingent on several assumptions. First, we assume that there are no capital flows and thus no transactions on the capital account. This means that the overall balance of payments is equivalent to the balance of trade. Second, assume that supply elasticities are infinite; the supply of imports and exports may be increased with no constraints. Finally, assume that prior to devaluation the balance of trade (and thus balance of payments) is balanced.

We will define q as the real exchange rate, as follows:

$$q = \begin{pmatrix} \text{Nominal} \\ \text{exchangerate} \end{pmatrix} \frac{\text{DometicPrice}}{\text{ForeignPrice}}$$

In order to have a balance of payments equal to zero we must have X = q. M, in which M represent imports and X represents exports.

We will define elasticity of demand for imports (E_{dm}) with respect to exchange rate as a measure of percentage change in imports due to a certain change in q. This will always be a negative value because imports fall as exchange rates rise.

$$E_{dm} = -\frac{\frac{\Delta M}{M}}{\frac{\Delta q}{q}} = -\frac{\Delta M}{\Delta q} \cdot \frac{q}{M}$$

Elasticity of demand for exports (E_{dx}) with respect to exchange rates may be defined in the same way and is a positive relationship.

$$E_{dx} = \frac{\frac{\Delta X}{X}}{\frac{\Delta q}{q}} = \frac{\Delta X}{\Delta q} \cdot \frac{q}{X}$$

The balance of trade is equal to X - q . M. We will completely differentiate this for a change in Q.

$$\frac{\Delta Balance of trade}{\Delta q} = \frac{\Delta X}{\Delta q} - \left(\frac{\Delta q}{\Delta q} \cdot M + \frac{\Delta M}{\Delta q} \cdot q\right)$$

This simplifies to the following: $\frac{\Delta X}{\Delta q} - M - \frac{\Delta M}{\Delta q} \cdot q.$

Recognizing that X = q . M, as balance of payments is equal to zero, and thus, $\frac{1}{M} = \frac{q}{X}$ we may pull M out, using $\frac{q}{X}$ to multiply by $\frac{1}{M}$ where necessary. Therefore right hand side of above equation is

$$= M\left[\frac{\Delta X}{\Delta q} \cdot \frac{q}{x} - 1 - \frac{\Delta M}{\Delta q} \cdot \frac{q}{M}\right]$$

Since the first term in the brackets is equal to the elasticity of demand for exports with respect to real exchange rate and the second is equal to elasticity of demand to imports with respect to exchange rate, we arrive at:

$$\frac{\Delta Balance of Trade}{\Delta q} = M[E_{dx} - 1 - E_{dm}]$$

Thus, in order to have a positive change in the balance of trade in response to a change in exchange rate, we must have

$$M[E_{dx} - 1 - E_{dm}] > 0$$

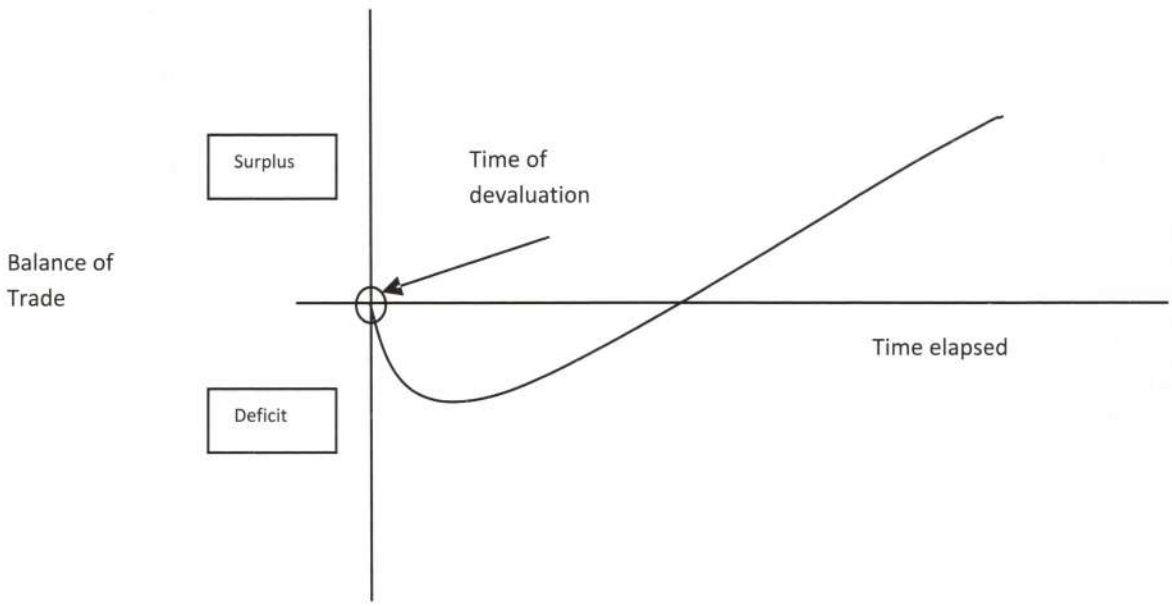
Since M is always greater than 0, and Edm is always negative, we arrive at the final Marshall-Lerner condition:

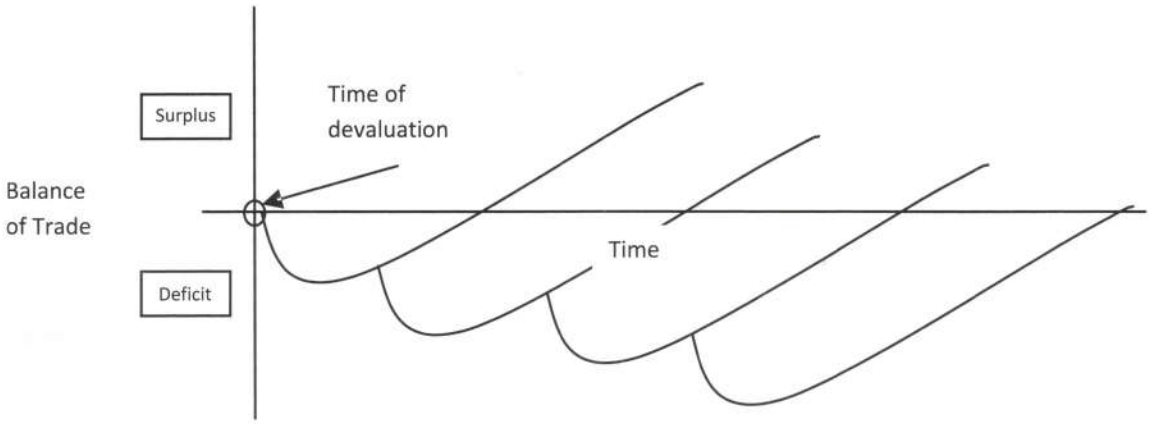
$$E_{dm} + E_{dx} \geq 1$$

If this condition is satisfied, we would expect to see a balance of trade surplus following a devaluation of currency. However, if it is not satisfied, devaluation will lead to a deficit. In realistic terms, the determinants of elasticity are twofold: the time elapsed after a change in exchange rate and the number of substitutes available for exports and imports. As described by Stephen Magee (1973), demand for exports and imports will become more elastic as time passes, as consumers and firms adapt to the new exchange rate. This is due to a lag time in contracts signed prior to and following devaluation which results in the price effects dominating in the short term. Only later will the quantity effects take force, increasing the balance of trade. Thus, following an initial deficit resulting from devaluation, the balance of trade will trend upwards into a surplus. This gives a graphical representation of the balance of trade in the following shape, from which the J-Curve hypothesis derives its name:

However, Kishore Kulkarni expanded upon this process in 1994, noting that the impact of successive devaluations was likely to result in "dynamic, persistent deficit," as the Marshall-Lerner condition is never satisfied. In this case, we would expect a graphical representation as follows:

In addition to the time determinate of elasticity, the availability of substitute goods and thus the type of good has an impact on the elasticities of demand for exports and imports. If there are many substitutes available for a given good, the foreign demand for it as an export is likely to display a high level of elasticity. Correspondingly, if a country imports a significant amount of goods with a high number of substitute goods available, its demand for imports will be highly elastic. Ellen Meade (1988) posits that industrial supplies and materials are more likely to respond quickly to changes in the exchange rate, whereas consumer goods will be less elastic and respond more slowly. An important example of this





principle is oil-as a good with very few substitutes, the demand for it displays very little response to variations in exchange rate.

It is important to note in this context the difference between a fixed and floating exchange rate regime. We have been referring to the devaluations which take place under fixed exchange rate systems as policy decisions. However, these effects may also be observed in the depreciation of currency according to market forces in a floating system. Indeed, in many cases, this depreciation of currency may be guided by direct or indirect government intervention in a managed float system, as is the case in Morocco.

Review of Relevant Literature

A wide range of empirical studies have been conducted in order to test the J Curve hypothesis, overall converging in recent years towards broad support of the theory. Several studies continue to test variations of the J Curve, describing the "delayed J-Curve" phenomenon, while Bahmani-Oskooeeworked in a series of studies to incorporate variables beyond demand elasticities to explain the J Curve. While some studies, particularly those conducted on several Asian countries, or focused on the impact of capital transactions, find no support for the J Curve, the general academic consensus is in support of the J curve under certain conditions.

The scope of J curve analysis is extensive and as such this paper will provide only a brief overview. Stephen Magee in 1973 provided one of the earliest supporting empirical studies of the J Curve hypothesis, describing the implications of adjustment lags and ultimately concluding that despite J Curve trends, devaluations have a positive long run impact on trade balance. Junz and Rhombergin the same year identified causes of lags up to five years in the realization of positive impact on the trade balance. While Noland (1989) found support for the J Curve in an empirical study of Japan's balance of trade, he concluded that policies designed to target the level of economic activity would be more effective than those which operated through exchange rate.In applying a J Curve analysis to the transition economies of Eastern Europe, Bahmani-Oskooe, Moshen, and Kutan (2009) found support for the J curve in Russia, Bulgaria, and Croatia. Further supportive J Curve analysis has been applied to bilateral trade relations rather than overall balance of trade, such as the 1996 study by Marwah and Klein. Other papers which provide support for the J Curve include those of Demirden and Pastine (1995), Gupta-Kapoor and Ramakrishnan (1999), and Lal and Lowinger (2002), among others.

Bahmani-Oskooee has conducted several studies in collaboration with other authors which incorporate a multitude of variables in addition to elasticities of demand in order to explain and describe the J curve. These studies incorporate factors such as world income, national income, and the availability of "high powered money," finding evidence of delayed J curve in a majority of nations examined. This concept of a delayed J Curve was first identified by Rosenweig and Koch in their 1988 study of the United States balance of trade, and later expanded upon. Mahdavi in 1993 identified the delayed J curve in the United States as well, explaining the pattern as a result of uncertainty over the duration of the exchange rate change.

However, some contradictory studies center on the case of several Asian countries, or those countries with a high level of capital transactions. Miles in 1979 concluded against both conventional theory and the J Curve, arguing that devaluations simply shifted transactions to the capital account and predicting no long term improvement of the balance of trade with devaluation. Separate studies by Zhang, Wilson, and Baharumshah on the bilateral trade relations of different Asian countries found no evidence of the J Curve in those countries. At best, support for the J curve in this region has been mixed.

The US has also been subject to extensive research on the J Curve. A simulation run by Moffett in 1989 broadly supported the J Curve in the US Balance of Trade. Meade's 1998 study of the United States J Curve led to her conclusions on the sectoral nature of the J Curve, finding the strongest impact in industrial supplies and materials. Rose and Yellen, however, contradict the J Curve hypothesis in a bilateral analysis of the United States and her 6 trading partners (1989). They recommend further testing of the elasticity variable directly. However, when Bahmani-Osskooee and Brooks ran an error correction on this data in 1999, they found limited support for the J Curve.

Despite some variations, the J Curve hypothesis is widely supported through empirical studies. In

general, later studies find greater supporting evidence than investigations written in the 1980s and late 90s. Through analysis of wide range of countries, J Curve theory has been expanded to include sectoral analysis, multiple variables of explanation, and a more thorough examination of the time effects. This paper will focus on the impact of currency devaluations on the balance of trade of transition economies in the former Soviet Union as compared to developing economies in Africa. Particular attention will be given to the form of devaluation and structure of the economy in order to provide insight into deviations.

Empirical Evidence

Transitional Economies

Following the fall of the Soviet Union, the key goal of most transition economies was to achieve a stable and moderate inflation rate (Bahmani-Oskooe and Kutan, 2009). The transitional economies in general went through a period of undervaluation of the real exchange rate which was overall corrected following a process of misalignments and appreciation of the real exchange rate. Over time, however, the goal of these economies turned towards establishing competitiveness, encouraging the devaluation of exchange rates, or in some cases, a switch to flexible exchange rates. The two countries selected for examination (the Czech Republic and Estonia) represent examples of each strategy.

A. The Czech Republic

In the first year of transition the Czech economy contracted sharply. Beginning in 1993 it started to recover and attained steady growth in 1995 and 1996. However, structural problems in enterprise and financial sectors as well as excessive wage and consumption growth caused a slowdown in this growth in the late 90s (The European Commission 1998). During this time period, the economy of the Czech Republic was not heavily agricultural. Rather, it featured a strong industrial sector supported by favorable lending terms extended to enterprises by the banking sector (Kay 2008). It received high levels of FDI and maintained a very large financial sector which contributed greatly to the moderate GDP growth experienced following currency depreciation (Kay 2007).

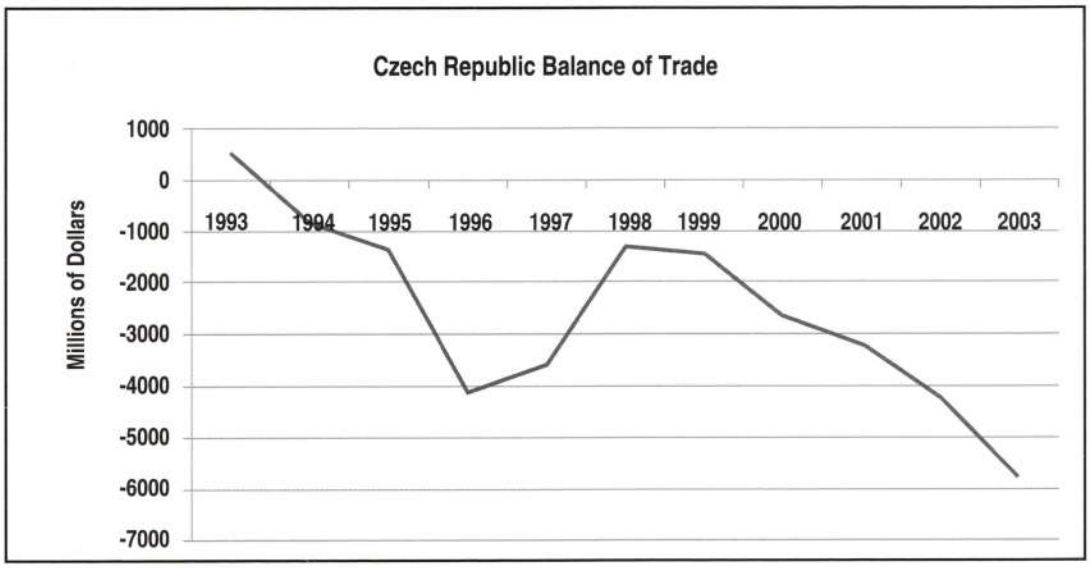
Following the fall of the Soviet Union, the Czech Republic began to peg its currency, the Koruna, to a basket of currencies in order to achieve stability. However, beginning in May of 1997, in response to economic tensions,it switched to a free float system subject to some central bank intervention (Hacker and Hatemi 2004). At this point, the Koruna was allowed to depreciate significantly and continued to fall until 2002, with another sharp dip from 1999-2000.

	Average Exchange Rate (National Currency per US Dollar)	Balance of Trade (dollars)
1993	29.153	466333364.632
1994	28.785	-819875392.270
1995	26.541	-1373523087.209
1996	27.145	-4127553020.168
1997	31.698	-3621726040.443
1998	32.281	-1308286938.648
1999	34.569	-1465751162.911
2000	38.598	-2689755313.839
2001	38.035	-3272573493.815
2002	32.739	-4264835726.290
2003	28.209	-5785485093.447

Represented graphically, the Balance of Trade for the Czech Republic displays some characteristics of the J Curve as well as support for the Kulkarni hypothesis. However, evidence is inconsistent and the Czech Republic represents the most anomalous of countries examined in this study.

Depreciation of the Koruna throughout 1996 and 1997 as a result of transition to a floating system was accompanied by an increasing deficit in the balance of trade, followed by a period of recovery. Initially this structure appears to support the J Curve hypothesis. However, the BOT deficit largely preceded currency depreciation and is more likely attributable to the fall in external demand for Czech products and increase in oil prices.In this case, the depreciation of the Czech Koruna was used not as a policy tool to directly increase balance of trade, but rather to help ease tensions created by structural issues in the economy. As such, the impact on balance of trade is irregular.

While the balance of trade displays a slight upturn from the years 1996-1998 in spite of continued (though milder) currency depreciation, this may be attributed to recovery from the recession of the mid-



90s, possibly in response to the structural reforms. Following this upturn, the graph displays the persistent and deepening balance of trade deficit predicted by the Kulkarni hypothesis. While no recovered surplus of balance of trade is demonstrated, this is supported by prior studies of the J-Curve which indicate that recovery of the balance of trade may take up to 5 years. The Czech Republic's balance of trade may have been further deepened by the successive devaluations which, as explained by the Kulkarni hypothesis, tend towards a persistent balance of trade deficit.

B. Estonia

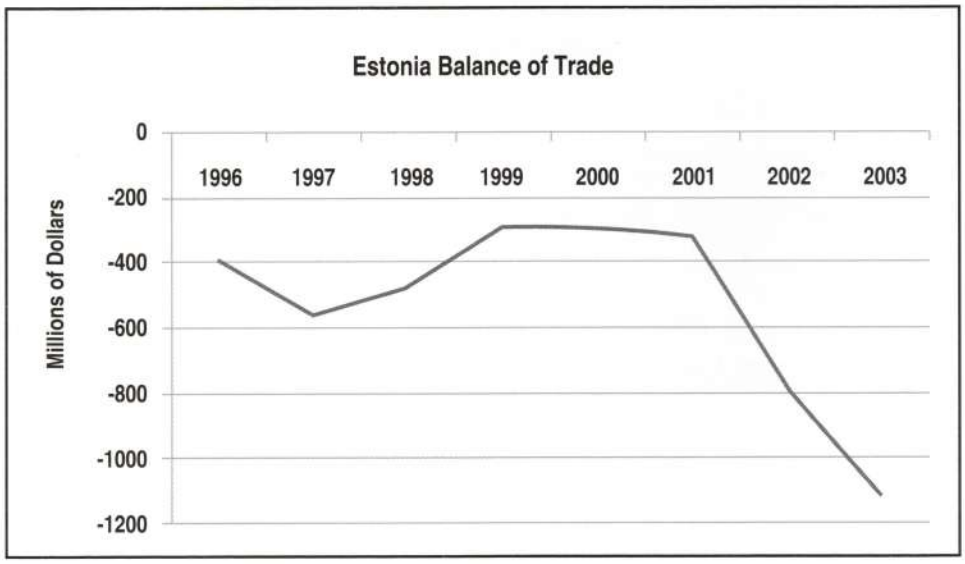
In transitioning to a market economy, Estonia faced a significant decrease in GDP which lasted until 1995, the first year of resumed growth (The European Commission 1998). While inflation was initially at very high levels (89.8% in 1993), it fell to under 10% by 1997. Throughout this time period, the service sector grew very rapidly. Agriculture remained a significant element of the Estonian economy, with clothing and food exports comprising the largest percentages of total exports. Largely as a result of economic growth, the trade deficit also increased rapidly, but was largely compensated by high levels of FDI and tourism (Ibid).

Estonia reintroduced the Kroon as its national currency in 1992, pegged to the Deutsche Mark (Bank of Estonia 2011). This held until 2004, when Estonia joined the ERM II currency system, which will not be considered within the scope of this paper (Ibid). During this time period, the Kroon was continually devalued, with the most significant devaluations occurring from 1996 to 1997 and from 2000 to 2001.

	Average Exchange Rate (National Currency per US Dollar)	Balance of Trade (Dollars)
1996	12.038	-398235485.950
1997	13.882	-561729553.875
1998	14.075	-478433380.640
1999	14.678	-294644154.246
2000	16.969	-299009347.520
2001	17.478	-324621263.961
2002	16.612	-779341245.580
2003	13.856	-1115281051.820

Graphically represented, the balance of trade demonstrates much stronger support for the Kulkarni hypothesis than that of the Czech Republic.

Following the 1996 devaluation of the Kroona, Estonia experienced an immediate deficit in the Balance of Trade, followed by limited recovery, in a classic J Curve. While this recovery was accompanied by minor devaluations of the Kroona, it is followed by a persistent and increasing deficit in response to a final major devaluation, supporting the Kulkarni hypothesis. Indeed, it is likely that the 2000-2001 drop in balance of trade represents a delayed response to the continuous devaluation process as well as the major devaluation of the period.Such an anomalous recovery period may be partially attributable to the abnormally strong flows of FDI and tourism in the country.



Developing Economies of Africa

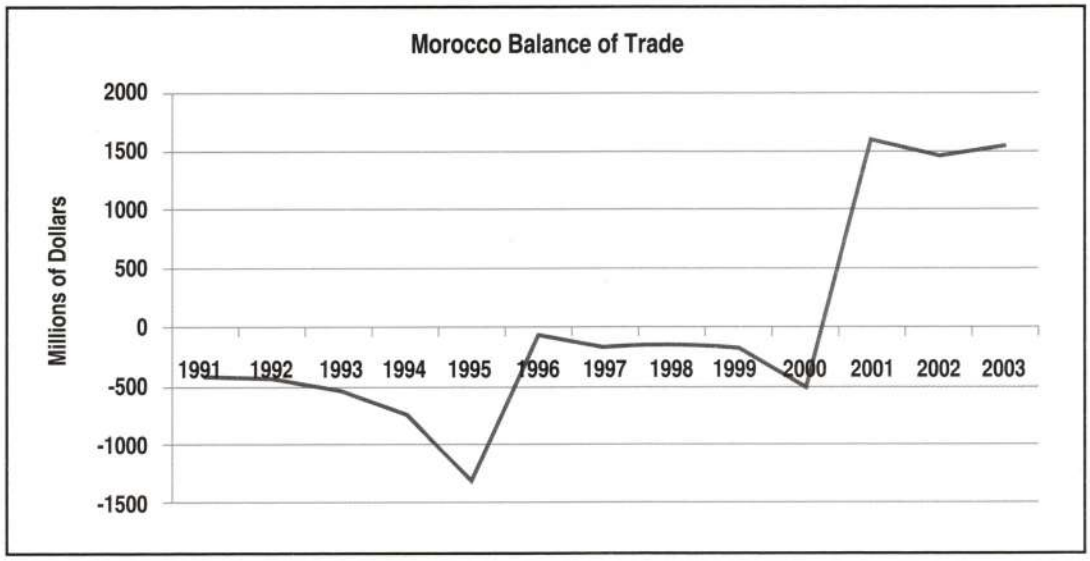
The World Bank classifies economies according to gross national income per capita (GNI) as low income, middle income (subdivided into middle and lower income), or high income. The economies selected for examination in this paper are classified as lower-middle income economies, falling into the category of developing nations. Developing nations are often typified by low financial flows (fitting the first assumption of the Marshall-Lerner Condition), agricultural and simple manufacturing economic activity, and some degree of government intervention in exchange rate determination. One of the most critical problems identified in such countries, particularly in Africa, is the deficit in government budget and balance of payments, making the J Curve hypothesis a particularly relevant theoretical framework for policy analysis.

A. Morocco

Morocco faced several economic challenges throughout the 1990s, including a cumbersome bureaucracy, lack of qualified workers, and lowered productivity rates which contribute to its lowered economic competitiveness (USAID 2013). In the 1980s, Morocco pursued austerity measures and pro-market reforms, overseen by the IMF. These led to increased stabilization reflected in a relatively steady growth rate, low inflation, and gradually falling unemployment since the late 1990s. Key sectors of the economy include agriculture, tourism, phosphates, textile, apparel, and subcomponents. Fuel costs are high and fuel is almost entirely imported, causing a high current account deficit.

Morocco maintains a tightly managed float of the Dirham against a basket of currencies,currently moving in line with Euro (USAID 2013), which the World Bank considers to be a fixed peg arrangement. Between 1991 and 2003 it has had 2 major devaluations. The first of these was from 1992 to 1993 during which the exchange rate rose by 8.9%, followed by devaluation from 1996 to 1997 during which the exchange rate rose by 9%. A further devaluation occurred from 1999 to 2000 during which the exchange rate rose by 8.3%.

	Average Exchange Rate (National Currency per US Dollar)	Balance of Trade (Dollars)
1991	8.707	-413252091.816
1992	8.538	-432660351.668
1993	9.299	-521362687.348
1994	9.203	-722938828.378
1995	8.540	-1296334224.962
1996	8.716	-58399179.811
1997	9.527	-168676604.160
1998	9.604	-145766283.374
1999	9.804	-170739334.125
2000	10.626	-500977063.067
2001	11.303	1606081584.716
2002	11.021	1472299560.671
2003	9.574	1552163225.376



Graphically represented, the balance of trade of Morocco demonstrates very strong support for the J Curve and limited support for the Kulkarni hypothesis.

Graphically represented, the balance of trade of Morocco demonstrates very strong support for the J Curve and limited support for the Kulkarni hypothesis.

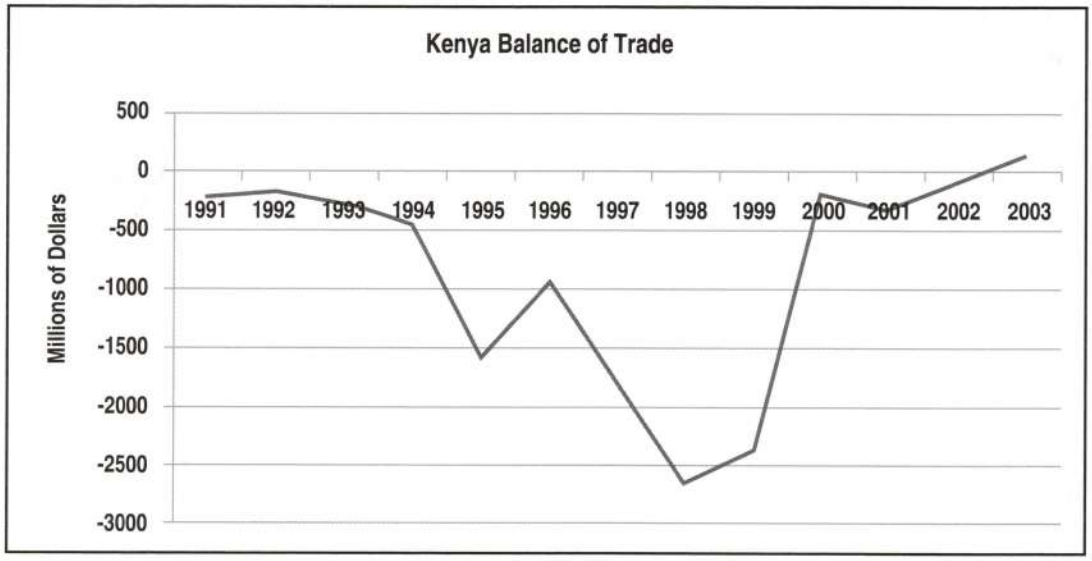
The impact of the devaluations in a J Curve pattern can clearly be seen by the deficits in balance of trade in 1994/1995, as well as in 2000. Following each devaluation, the balance of trade decreases significantly. In between these deficits, the balance of trade begins to trend towards surplus, but further devaluation prevents realization of the J Curve. The economy reaches surplus following the final devaluation as the elasticities are allowed to stabilize. However, this graph provides only limited support for the Kulkarni hypothesis as the successive devaluations do not result in persistent and dynamic deficits. It is possible that this is a result of the type of goods Morocco exports regaining elasticity rapidly following devaluation. The ability of key export sectors to rapidly adapt to changes in balance of payments are able to compensate for the increased cost of the primary import (oil), which remained at relatively low levels, so as to rapidly satisfy the Marshall-Lerner Condition.

B. Kenya

Of the East African region, Kenya has long been the largest and most advanced economy, positioning it in a regional leadership role. The majority of its exports to the EU are agricultural, whereas it primarily exports manufactured goods to the United States (Bureau of Economic and Business Affairs 2012). However, Kenya has lagged behind other countries of the region in the attraction of FDI partially as a result of strict investment code, poor infrastructure, and high levels of corruption (Ibid). The key problems that Kenya's economy faces include high tax levels, high losses from crime, high manufacturing costs, and low productivity.

The Kenyan shilling is managed under a floating exchange rate tied to a basket of foreign currencies. While there is no predetermined path for the exchange rate, the government does engage in direct and indirect interventions in order to manipulate the exchange rate (IMF 2003-2008). In this system, the most severe devaluations or depreciations occurred from 1992 to 1993, when the exchange rate nearly doubled, followed by another significant increase from 1998-1999. These sharp depreciations were accompanied by more minor deprecations from 1995-1996 and constant depreciation from 1999 until 2002.

	Average Exchange Rate (National Currency per US Dollar)	Balance of Trade (Dollars)
1991	27.508	-213320795.506
1992	32.217	-180154267.179
1993	58.001	-261869235.622
1994	56.051	-448915490.293
1995	51.430	-1578240551.838
1996	57.115	-961189672.741
1997	58.732	-1790669371.427
1998	60.367	-2632734196.171
1999	70.326	-2365219129.993
2000	76.176	-199391622.202
2001	78.563	-320276833.921
2002	78.749	-117669073.526
2003	75.936	132419234.801



Graphically displayed, this data show support for the J Curve theory, as well as the shifting J curves predicted by the Kulkarni Hypothesis.

Following the depreciations of 1992 and 1995, the Kenyan BOT displays a slightly delayed J curve. Both depreciations are accompanied by initial deepened deficit in the BOT, followed by limited recovery. In each case, the Kulkarni hypothesis holds as the dynamic deficit is deeper than that experienced previously. This remarkable consistency with theory is likely a result of consistence with initial assumptions as Kenya receives relatively flew transactions on the capital account. However, following the final depreciation in 1998, the Kenyan BOT did not trend to deficit but rather rapidly reached surplus. This anomaly may be attributed to a relatively stabilized floating exchange rate which is better able to compensate for inflows and outflows of trade.

Conclusion

After analyzing the response of the Balance of Trade to adjustments in exchange rates under a variety of conditions, this paper finds some support for both the J-Curve and Kulkarni hypotheses in all cases. While country conditions may vary, particularly between developing and transitional economies, causing some deviation, balance of trade patterns following an increase of exchange rate in both floating and fixed systems tend to display initial deficit followed by long-term trends towards surplus. In the case that a major devaluation or depreciation occurs before the economy has fulfilled the Marshall Lerner condition and reached surplus, the deficit is generally deepened, as predicted by Kulkarni. However, if the trade of an economy relies primarily on exports, it may be able to devaluate more rapidly while avoiding dynamic deficit on the current account.

The developing economies of Africa provided the strongest support for the J Curve and Kulkarni hypotheses. Kenya in particular was remarkably consistent with theoretical predictions until reaching balance of trade surplus in 2002. By contrast, Morocco was able to rapidly reach surplus despite consistent devaluations, likely as a result of highly elastic demand for its imports. The transitional economies of the former Soviet Union displayed a slightly different pattern on their balance of trade in response to successive devaluation. The most problematic case was in the Czech Republic, where depreciation appeared to have a rapid positive impact on the balance of trade. Factors which may account for this include structural reforms within the economy which accompanied devaluation, as well as non-traditional aims of depreciation reached through transition to a floating exchange rate. Estonia, while receiving high levels of capital inflows nonetheless displayed the persistent deficit predicted by the Kulkarni hypothesis, after a slight delay. Overall, these capital flows appear to be a strong predictor of adherence to the Kulkarni hypothesis while system of exchange rate determination has only a minor impact.

Composition of imports and export presents an intriguing opportunity for further research, particularly in the cases of Estonia and Morocco, which both displayed rapid increases on the balance

of payments despite continued devaluation of currency under a fixed system. Sectoral elasticities of demand may explain such behavior and a more thorough understanding of these differentiations would be valuable in a policy making context. Overall, support for the J-Curve as well as the Kulkarni Hypothesis under a variety of countries indicates important policy making considerations, in exchange rate determination, particularly for developing nations. Discrepancies in empirical results may stem from variances in economic structure, level of financial flows, composition of the economy, and method of determining exchange rate.

References

Baharumshah, A.Z. (2001). The effect of exchange rate on bilateral trade balance: New evidence from Malaysia and Thailand. Asian Economic Journal15(3), 291-312

Baharumshah, A.Z. (2001). The effect of exchange rate on bilateral trade balance: New evidence from Malaysia and Thailand. Asian Economic Journal15(3), 291-312

Bahmani-Oskooee, M. and Brooks, T.J. (1999). Bilateral J curve between US and her trading partners. Weltwirtschaftliches Archiv135, 156-65.

Bahmani-Oskooee, M. and Malixi, M. (1992). More evidence on the J curve from LDCs.Journal of Policy Modeling14(5), 641-653.

Bahmani-Oskooee, Mohsen and Kutan, Ali M. (2009). The J curve in the emerging economies of eastern Europe.Applied Economics, 41(20), 2523-2532.

Bank of Estonia. (2011, February 17). Estonia has changed over to the Euro-why?Retrieved from http://euro.eesti.ee/EU/Prod/Euroveeb/Main_Page/left_menu/Changeover_to_the_euro_in_Estonia/12_211205_Euromoju.html.

Bureau of Economic and Business Affairs. (June 2012). 2012 investment climate statement Kenya. Retrieved from http://www.state.gov/e/eb/rls/othr/ics/2012/191175.htm

Cooper, R. (June 1971). Currency devaluations in developing countries.Princeton essays in international finance, 86.

Demirden, T. and Pastine, I. (1995). Flexible exchange rates and the J-curve: An alternative approach. Economics Letters 48(3-4), 373-377.

The European Commission. (1998). Czech Republic. Agricultural situation and perspectives in the central and eastern European countries.

The European Commission. (1998). Estonia.Agricultural situation and perspectives in the central and eastern European countries.

Gupta-Kapoor, A. and Ramakrishnan U. (1999). Is there a J-curve? A new estimation for Japan. International Economic Journal 13(4) 71-79.

Hacker, R.S. and Hatemi, A. (2004) The effect of exchange rate changes on trade balances in the short and long run.Economics of Transition, 12(4), 777-779

The International Monetary Fund. Classification of exchange rate regimes and monetary policy frameworks.Retrieved fromhttp://www.imf.org/external/NP/mfd/er/index.aspx.

The International Monetary Fund. (2003-2008)International Financial Statistics. Retrieved from http://www.imfstatistics.org/imf/.

Junz, H.B. and Rhomberg. (1973).Price competitiveness in export trade among industrial countries.American Economic Review, 63(2),412-18.

Kay, N. (2008). The Czech labour market: Room for further improvement.ECFIN Country Focus, 5(13)

Kay, N. (2007). Liberalisation and development of the Czech financial sector: More to come.ECFIN Country Focus, 4(12)

Krugman, P. and Obstfeld, M. (2009).International economics: Theory and policy (8th ed.). Boston: Addison-Wesley.

Kulkarni, K. (2007). Readings in international economics: Selected writings of Prof. Kishore G. Kulkarni (3rd ed.). New Delhi, India: Serials Publications.

Lal, A. and Lowinger, T. (2002). The J-curve: Evidence from East Asia. Journal of Economic Integration 17, 397-415.

Mahdavi, S. and Sohrabian, A. (1993). The exchange value of the dollar and the US trade balance: An empirical investigation.Quarterly Review of Economics and Finance33(4), 342-58.

Magee, S. Currency contracts, pass through, and devaluation. Brooking Papers on Economic Activity, 1, 303-325.

Marwah, K. and Klein, L.R. (1996). Estimation of J-curve: United States and Canada.Canadian Journal of Economics29, 523-39.

Meade, E. (1998). Exchange rate, adjustment, and the J-curve.Federal Reserve Bulletin, 74, 633-644.

Miles, M.A. (1979). The effects of devaluation on the trade balance and the balance of payments: Some new results.Journal of Political Economy, 87(3), 600-620.

Moffet, M.H. (1989). The J-curve revisited: An empirical examination for the United States.Journal of International Money and Finance, 8(3), 425-444.

Noland, M. (1989).Japanese trade elasticities and the J-curve.Review of Economics and Statistics, 71(1), 175-9.

Rosensweig, J.A. and Koch, P. (1988). The US dollar and the delayed J-curve. Economic Review73, 2-15

Rose, A.K. and Yellen, J. (1989). Is there a J-curve?Journal of Monetary Economics, 24, 2-15.

USAID. (May 2013). Morocco: Economic growth and trade.Retrieved from http://www.usaid.gov/morocco/economic-growth-and-trade.

Wilson, P. (2001). Exchange rates and the trade balance for dynamic Asian economies: Does the J-curve exist for Singapore, Malaysia, and Korea?Open Economies Review12(4), 389-413.

World Bank. (2013). How we classify countries. Retrieved from http://data.worldbank.org/about/country-classifications.

Zhang, Z. "The Exchange Value of the Renminbi and China's Balance of Trade: An Empirical Study. NBER Working Papers Series, Working Paper #5771 (1996).

Krugman, P. and Obstfeld, M. (2009).International economics:

Theory and policy (8th ed.). Boston: Addison-Wesley.

Kulkarni, K. (2007). Readings in international economics: Selected writings of Prof. Kishore G. Kulkarni (3rd ed.). New Delhi, India: Serials Publications.

Lal, A. and Lowinger, T. (2002). The J-curve: Evidence from East Asia. Journal of Economic Integration 17, 397-415.

Mahdavi, S. and Sohrabian, A. (1993). The exchange value of the dollar and the US trade balance: An empirical investigation.Quarterly Review of Economics and Finance33(4), 342-58.

Magee, S. Currency contracts, pass through, and devaluation. Brooking Papers on Economic Activity, 1, 303-325.

Marwah, K. and Klein, L.R. (1996). Estimation of J-curve: United States and Canada.Canadian Journal of Economics29, 523-39.

Meade, E. (1998). Exchange rate, adjustment, and the J-curve.Federal Reserve Bulletin, 74, 633-644.

Miles, M.A. (1979). The effects of devaluation on the trade balance and the balance of payments: Some new results.Journal of Political Economy, 87(3), 600-620.

Moffet, M.H. (1989). The J-curve revisited: An empirical examination for the United States.Journal of International Money and Finance, 8(3), 425-444.

Noland, M. (1989).Japanese trade elasticities and the J-curve.Review of Economics and Statistics, 71(1), 175-9.

Rosensweig, J.A. and Koch, P. (1988). The US dollar and the delayed J-curve. Economic Review73, 2-15

Rose, A.K. and Yellen, J. (1989). Is there a J-curve?Journal of Monetary Economics, 24, 2-15.

USAID. (May 2013). Morocco: Economic growth and trade.Retrieved from http://www.usaid.gov/morocco/economic-growth-and-trade.

Wilson, P. (2001). Exchange rates and the trade balance for dynamic Asian economies: Does the J-curve exist for Singapore, Malaysia, and Korea?Open Economies Review12(4), 389-413.

World Bank. (2013). How we classify countries. Retrieved from http://data.worldbank.org/about/country-classifications.

Zhang, Z. "The Exchange Value of the Renminbi and China's Balance of Trade: An Empirical Study. NBER Working Papers Series, Working Paper #5771 (1996).