

## Are Devaluations Expansionary or Contractionary? A survey article

Mohsen Bahmani-Oskooee and Ilir Miteza<sup>1</sup>

### ABSTRACT

*Earlier studies that investigated the impact of devaluation on domestic production relied upon the aggregate demand analysis. They argued that by making a country's exports cheaper and imports expensive, devaluation is said to stimulate the aggregate demand and thus, domestic production. In this case, devaluation is said to be expansionary. Recent studies, however, have argued that by raising the cost of imported inputs, devaluation contracts aggregate supply. If decrease in aggregate supply more than offsets the increase in aggregate demand, output eventually declines. In this case, devaluation is said to be contractionary. This article reviews the existing research on the effects of devaluation on domestic production and concludes that the impact is country specific and depends on model specification and results depend on the estimation technique.*

### 1. INTRODUCTION

One of the arguments of the Keynesian open-economy macroeconomics was the belief that devaluation tends to boost domestic real income and output in addition to increasing net exports and the price level. However, the advent of the post 1970's oil crisis urged economists as well as policymakers to reconsider the significance of the aggregate supply side in the existing theoretical framework that addresses the effectiveness of devaluation. The ensuing revisions to macro-economic theory and policy were so dramatic that economists were about to cast doubt on the effectiveness of devaluation. Numerous developing countries retained their fixed exchange rate regimes even after the mass implementation of floating rates in the industrial countries of the post 1973 era. However, authorities have often yielded to the pressures of strong external disturbances and have from time to time resorted to devaluations. Central banks often devalue the domestic currency so that they can stimulate net

exports. Increased exports, through multiplier effect is expected to increase aggregate demand and ultimately, domestic production and employment. If this takes place, we say devaluation of domestic currency is expansionary. However, as this review will show, devaluation could induce other forces that could offset the increase in output and eventually lead to a decline in output. In this case we say devaluation is expansionary.

Clearly, assuming there is no money illusion, the real effects of a nominal devaluation would not be persistent. Nonetheless, under certain conditions, devaluation can be a catalyst in the process of real economic adjustment to various shocks. This is precisely the motivation for devaluations to be frequently included among the central elements of stabilization programs. Indeed, devaluation has been increasingly prescribed and used as a stabilization device in developing countries as part of International Monetary Fund orthodox adjustment programs — all the more reason why exchange rate policies have recently been generating considerable controversy (e.g. events in Asia). The conventional textbook treatment is based upon the proposition that devaluation improves competitiveness, boosts exports and switches demand towards domestically produced goods.<sup>2</sup> In addition, countries that undergo real depreciations are believed to have better chances in the journey toward more open economies and sustained growth because a depreciated exchange rate will likely prevent destabilizing financial crises (as in Mexico during 1982 and 1995).

Backed by this prevailing theoretical framework, opponents of fixed exchange rates grew stronger in light of financial crises like the post-1994 peso devaluation crisis in Mexico and seized the opportunity to extol the benefits of flexible exchange rate regimes. They argued that fixed exchange rate regimes have often led to real appreciations, which in turn have slowed growth. Based on these critiques, (see Dornbusch and Wemer, 1994), policy-makers were cautioned to maintain real exchange rates at competitive levels in order to avoid external sector crises, while stimulating output growth. However well-grounded in the economic textbooks, the proposition that devaluations are genuinely expansionary has encountered serious objections from theoretical studies as well as historical facts. In point of fact, stabilization packages, that included a devaluation component, have been criticized by an ever-growing body of literature that considers exchange rate a questionable instrument of economic policy, particularly in developing countries.

While many agree on the positive effects that devaluations have on the trade balance as well as on the possibility of some inflationary side effects, scepticism arises primarily for of two reasons. First, in order to implement an effective devaluation, authorities have to achieve a real devaluation. Yet, the profession recognizes the theoretical and empirical evidence that warns policy-makers away from maintaining undervalued real exchange rates on a sustained basis since it is likely to result in spiralling inflation and a continuous need for ever-growing depreciations. Second, by assuming that below-equilib-

rium real exchange rates can be feasibly maintained, their impact on output and employment is still unknown and extensively argued in the literature of the past two decades. The theoretical likelihood that devaluations could be contractionary was in many instances supported by actual experience. Several authors (e.g. Gylfason and Radetzki, 1991; Bahmani-Oskooee, 1996) observed output declines in the aftermath of devaluations and pointed out that the beneficial relative price adjustment generated by devaluations may come at a high price — recession. A vast body of research has made its way into the literature under the subject heading of *contractionary devaluation*. Countries such as Mexico, where real depreciations were consistently coupled with output contractions, and where real appreciations were associated with output expansions, have recently become conventional examples of the contractionary devaluation problem.

The threat of the contractionary devaluation is real. In fact, many developing countries, which have experienced severe balance of payments crises as a result of their over-valued currencies, have often resisted devaluation as an adjustment instrument mainly because of two reservations: (i) uncertainty about the influence of exchange rates on import demand, export supply, and domestic expenditures; (ii) impending negative side effects on output growth, employment, inflation, net international reserves as well as on real wages and income distribution. It is with regard to this resistance that Cooper (1971c) observes that changes in Finance Ministers often seem to follow devaluations. Inasmuch as the devaluations may be contractionary, policymakers will be at an impasse when trying to foster output growth while at the same time improving the balance-of-payments position.

In an attempt to assess the effects of devaluation on output, the literature has taken four different routes. The first is a factual method that compares output performance before with that after the currency devaluation and is commonly known as the 'before-after' approach. The second method compares output performance in devaluing countries with performance in a 'control group' of non-devaluing countries. This method is often referred to as the 'with-without' or 'control-group' approach. The third, 'actual-versus-target' method, employs econometric models so as to evaluate the impact of exchange rate changes on real output. The fourth is a less direct method that relies on simulation models or reduced-form equations to examine the impact of exchange rate changes on domestic output. The latter is known as the 'comparison-of-simulations' approach because it consists of comparing the simulated performance of policy packages that include devaluation with some alternative set of policies.

In what follows, we classify studies that fit to each approach and review them in detail. Since there is no other review article on the subject, the purpose is to assemble the literature in one article to help the researchers as well as graduate students.

## 2. BEFORE-AFTER APPROACH LITERATURE

Studies falling in this category mostly comprise the earliest part of the literature on contractionary devaluation. Diaz-Alejandro (1965) examines Argentina's 1959 devaluation. After studying the period between 1955 and 1961 he concluded that the devaluation of the peso had contractionary effects on the Argentinean economy. He explained this adverse impact by a shift in income distribution in favor of high-propensity savers that shrank consumption expenditure and real absorption.<sup>3</sup> Moreover, according to him, the mechanism responsible for the improvement of the current account is not related to the substitution effects triggered by the real devaluation. Instead, it is the fall in absorption relative to output that leads to the current account improvement. Another influential paper on the subject by Cooper [1971a] adopts the before-after approach while investigating twenty-four devaluation episodes in 19 developing countries during the 1959-66 period. He attempted to assess the impact effects of a devaluation on inflation, the balance of trade and payments, as well as on aggregate demand. Although Cooper's empirical findings involve only the short-run effects of devaluation, he deduced that, while devaluations help improve the external position of a country, they can be costly in that they have a predisposition to bring about output contractions as well as an acceleration in inflation.

Devaluation itself often initially tends to depress economic activity in the devaluing country, contrary to what has normally been expected. (Cooper 1971a, p. 504)

In an effort to reveal the mechanism of transmission, Cooper acknowledges that there can be redistribution of income from non-traded goods industries to traded goods industries, and he accepted that the impact of these redistributive effects on demand can be ambiguous. Besides the important shortcomings that plague all 'before-after' studies, Cooper's paper also suffers from a very unrealistic assumption that devaluation can be expected to have its principal effect in the following year (Edwards, 1986a).

Krueger (1978) studied 22 major devaluations of the countries included in the NBER project on trade liberalization spanning the period from 1951 to 1970. She found that in only three out of 22 episodes were devaluations followed by severe and prolonged recessions. Although other countries also suffered growth rate slowdowns, they still could not be considered to have fallen into a recession. She did reckon the fact that a good deal of the resulting deflationary impact may have stemmed from domestic inflation-reducing stabilization policies. Krueger inferred that the evidence did not support the contractionary devaluation hypothesis.

Edwards (1989b) uses 39 devaluation episodes in order to analyze the reaction of aggregate output during the period between 3 years prior to the devaluation and 3 years after the devaluation. He notices that real GDP growth rates start falling before the devaluation takes place and therefore infers that

instituting exchange and trade controls prior to devaluations brings about serious distortions that become a drag on the performance of the economy. According to Edwards '... the evidence ... strongly suggests that in many cases devaluations have historically been associated with declines in the level of economic activity around its trend. These results provide some temporary evidence tending to support the contractionary devaluation hypothesis.'

The before-after approach suffers from one major limitation in that it is not based on a strict *ceteris paribus* assumption. Such a method will therefore never produce an estimate of the independent impact of devaluation on output as other domestic or international determinants of aggregate output are changing. What seems to be contractionary devaluation might well be shifts in other exogenous variables that contract aggregate demand and thus, output.

### 3. CONTROL GROUP APPROACH

The control-group approach compares before-after output performance in devaluing countries with output performance in a set of non-devaluing countries (the control group) during the same time span. Since this method assumes that all devaluing and control group countries face the same exogenous external factors, the difference in the output performance of these two groups should only reflect the effect of devaluations. Therefore, by isolating the effects of devaluation from the effects of other variables on output, the control-group approach ought to outperform the before-after methodology.

Since devaluation has by and large been a key component of IMF stabilization programs, some studies have therefore approached the contractionary devaluation issue in the context of these programs. Donovan's (1981) first study of this sort investigated 12 devaluations conducted under IMF programs during the 1970-1976 period. The control group of countries without programs was chosen from a pool of non-oil developing countries, and the comparisons were conducted over one-year and three-year time spans. The comparisons showed that export growth rates were consistently higher for program countries, while output growth was rather ambiguous. The one-year comparisons exhibited a clear improvement in output growth in program countries relative to the non-oil developing countries. However, in the three-year comparisons, the decline in growth for program countries exceeded that of the non-program countries. A later study by Donovan (1982), considers an expanded sample of 78 IMF-supported programs during the period 1971-80. By using the same analysis as in the first study, Donovan observed that program countries exhibited relative improvement in the performance of the external sector as well as inflation. In contrast to his initial study, however, he found that the decline of growth rates exceeded the average decline for the control group in the one-year comparisons, but fell short of it in the three-year comparisons.

Drawn also by an interest to evaluate IMF supported programs, Gylfason (1987) investigated 32 devaluation cases during 1977-79 by using a compari-

son-group methodology. The control group consisted of developing countries with balance of payments difficulties during the 1975-77 period. Gylfason applied nonparametric statistical tests to establish whether the difference between the performance of macroeconomic variables for program countries and that of the control group in the course of a three-year period was significantly different. Beyond finding a relative improvement in the balance of payments in program countries as well as no difference in the inflation performance, he concluded that differences in output growth between the two groups could not be considered statistically significant.

Important papers relying on the control-group approach to re-examine the contractionary devaluation problem includes studies by Kamin (1988) and Edwards (1989a; 1989b). Kamin analyzes 50 to 90 episodes from a sample of 107 devaluations during the 1953-1983 period. He examines the performance of macro variables by testing the statistical significance of the difference between performance of the variables for the devaluing country and the control group. Kamin discovers that typically most devaluations do not result in a reduction of output levels. Moreover, growth rates remain positive in most cases. Instead, he notices that, during the year prior to devaluation, growth rates plummet and remain rather steady for up to one year after the devaluation. Only afterwards do growth rates recover and outperform the control group. Kamin concludes that the evidence does not favor the contractionary devaluation hypothesis. Edwards (1989a) examines the performance of several macroeconomic variables in 18 devaluation cases between 1962 and 1982 in Latin America. He tracked real output growth rates in the course of a period beginning three years before the devaluation and ending three years after the devaluation. A set of 24 developing countries that kept fixed nominal exchange rates in the course of the same period was chosen as the 'control group'. By using non-parametric statistical tests to conduct comparisons he found that output growth rates drop during the years encircling devaluations. Edward reckons that this may well be the result of policies and/or restrictions that have complemented Latin American devaluations, rather than the outcome of the devaluation itself. Therefore to split the impact on aggregate output into that stemming from devaluation on the one hand and that coming from other accompanying macroeconomic or trade policies on the other hand is a daunting task.

In another paper Edwards (1989b, pp. 320-324) considered 39 devaluation episodes in order to study its impact on economic activity by means of the 'control group' approach as well as regression analysis. The clear pattern of growth rates declining prior to devaluation dates are, according to Edwards, a manifestation of the enforcement of exchange and trade controls that typically lead devaluation. These controls are more than likely to bring about significant distortions that will eventually reflect in the reduced growth rates even before the devaluation hits. Nevertheless, the outcome of his 'control group' methodology demonstrated that often devaluations are accompanied with a

fall of output growth rates. It is worth noting that Edwards uses the 'control group' approach only as prologue to his regression analysis and acknowledges, 'this evidence is only suggestive'.

Although the control group methodology is better than the before-after methodology it still suffers from an intrinsic biasedness. More specifically, there is an adverse selection problem because program countries are likely to have a rather poor economic performance before the onset of the program. In fact balance of payments difficulties are typically a prerequisite for receiving financial support from the IMF. Consequently, program countries are selected non-randomly and thus have a systematic difference with non-program countries at the beginning of the program period. This selectivity bias will likely distort the simple control group approach estimator since it attaches differences in performance entirely to program or devaluation status. However, during-the-program differences in performance between the two groups may well be dedicated to different starting positions. The control group approach will exaggerate the positive impact of a program/devaluation when past poor economic performance indicates an improvement of the current conditions. The opposite will be true if past poor performance indicates subsequent deterioration.

#### 4. MACRO-SIMULATION APPROACH

The macro-simulation methodology relies on simulations of economic models to infer the theoretical performance of output after a hypothetical devaluation takes place. As Agenor (1991, pp. 26) noted, '[s]tudies using a macro-simulation approach have as a major advantage the fact that they usually provide considerable information on the transmission process of exchange-rate changes on output, contrary to factual approaches.' This methodology is particularly useful for comparing the outcomes of alternative policy packages that may contain various combinations and/or dosages of devaluations and other policy instruments.

The theoretical models on which the macro-simulation approach is built upon emanate primarily from two schools of thought. The 'orthodox' school maintains that devaluation is expansionary because of its expenditure switching effects and the increased production of tradables that it stimulates. On the other hand, the new structuralist school disagrees with this argument and has made significant contribution to the contractionary devaluation viewpoint. Since the orthodox standpoint can be safely considered familiar ground, focus is on the theoretical models of the new structuralist literature.

Most of the early theoretical models presented in the literature concentrated on the effects of devaluations on the demand side of the economy. Studies by Diaz-Alejandro (1963), Krugman and Taylor (1978), Barbone and Rivera-Batiz (1987) constitute central pillars of the contractionary devaluation literature. Several studies have dealt with the supply side channels that render devaluations contractionary. Bruno (1979), Gylfason and Schmid (1983), van Wijnbergen (1986), Agenor (1991), Gylfason and Radetzki (1991), and Taya

(1999) belong to this group. The most important reasons for a devaluation to cause a contraction of the aggregate demand include:

(1) redistribution of income towards economic entities with high marginal propensity to save (Diaz-Alejandro, 1963; Cooper, 1971a; Krugman and Taylor, 1978). Devaluation typically boosts profits in export and import-competing industries as it leads to higher relative prices for traded goods. When this increased price level leads to lower real wages, national spending is likely to shrink since the marginal propensity to save from profits exceeds that from wages.

(2) A decline in investment (Branson, 1986; van Wijnbergen, 1986). Since, often, new investment consists largely of imported capital goods, a real depreciation will render capital more costly in terms of home goods. This, in turn, is likely to depress new investment and aggregate demand.

(3) Increased debt and debt service payments in local currency (Cooper, 1971a; Gylfason and Risager, 1984; van Wijnbergen, 1986). For a country that has accumulated external loans denominated in foreign currency, this heavier burden drains off resources that could be used in spending and production, resulting in reduced aggregate output.

(4) Reduction in real wealth or real balances (Bruno, 1979; Gylfason and Schmid, 1983; Hanson, 1983; Gylfason and Radetzki, 1991). A higher price level ensuing from devaluation reduces real cash balances and real wealth. Thus, a fall in expenditure will be needed in order to restore real balances.

(5) Low government marginal propensity to spend out of tax revenue under *ad valorem* taxes on trade (Krugman and Taylor, 1978). Devaluation increases the domestic currency value of trade and causes *ad valorem* taxes (tariff revenue) to rise. As a result, there will be a redistribution of income from the private sector to the government with a marginal propensity to save that is close to unity in the short-run. Consequently, aggregate demand will contract.

(6) Real income declines because trade balance is initially in deficit (Cooper, 1971b; Krugman and Taylor, 1978). When the trade balance is in deficit, real income at home tends to fall as imported goods become more expensive.

(7) Increased nominal interest rates are possible (Bruno, 1979; van Wijnbergen, 1986). As devaluation is passed on in domestic prices and wages, a reduction in the real volume of bank credit and the monetary base occurs, which induces interest rates to rise.

(8) Foreign profit income increases (Barbone and Rivera-Batiz, 1987). The short-run redistribution of income from wages to profits under foreign own-



ership of capital will cause a portion of the increased profits to leak to the rest of the world.

Devaluations may reduce the aggregate supply mainly via three main channels:

(1) price of imported production inputs increase (Bruno, 1979; Gylfason and Schmid, 1983; Hanson, 1983; Gylfason and Risager, 1984; Islam, 1984; Gylfason and Radetzki, 1985; Branson, 1986; Solimano, 1986; Wijnbergen, 1986). Increased production costs will then clearly reduce supply.

(2) Wage indexation based on foreign and domestic price levels (Hanson, 1983; Gylfason and Risager, 1984; Islam, 1984; Gylfason and Radetzki, 1985; Branson, 1986; Edwards, 1986b; Solimano, 1986; Wijnbergen, 1986). Increased prices for tradables caused by devaluation may lead labour to demand higher wages, which could produce adverse supply effects.

(3) Working capital grows costlier as real balances decline (Bruno, 1979; Wijnbergen, 1986). If devaluation increases the demand for money, interest rates will climb, making working capital more costly and discouraging production.

While attempting to research the effects of devaluation, the theoretical models have assumed different scopes in terms of country-specific or multi-country frameworks as well as short-run versus long-run effects. At the same time, different authors have made dissimilar assumptions about the behavior of macro variables.<sup>4</sup> The latter cautions against assessing the results of any two models without considering the differences in model specifications. Krugman and Taylor (1978) developed a model with a non-traded goods sector, imported inputs and mark-up pricing where output is demand-determined. They follow a small country assumption when they take exports as priced in foreign currency and perfectly supply inelastic. The outcome of their model dictates that in the short-run, absent substitution in production and assuming an initial position of deficit, devaluation will inevitably increase local currency expenditure on imports by more than the additional export revenue. Hence devaluation will bring about a reduction in aggregate demand, production of home goods and total output.

Hanson (1983) model incorporates the Cooper and Krugman-Taylor models as special cases. His framework consists of a country that imports consumption goods as well as inputs for home goods. Hanson demonstrates that Krugman-Taylor's model ignores the realistic assumption of substitution in production as well as consumption, and thus it exaggerates the likelihood of a contractionary devaluation on the demand side. Based on his theoretical

model, he deduces that devaluation will prove contractionary only if elasticities of demand for imported inputs and for imported consumption goods are especially low or trade deficits are sizeable. Hanson backs his theoretical conclusions with facts that counter the contractionary devaluation hypothesis. In the Southern Cone of Latin America that best fits his assumptions, many devaluations did not turn out to be contractionary.

Gylfason and Schmid (1983) incorporate the cost of intermediate goods in a log-linear open economy macroeconomic model. Depending on which side of the economy is considered, they demonstrate that devaluation may result in two opposite effects. First, it may expand output via the demand channel. Secondly, it may reduce aggregate supply via its effect on the cost of imported intermediate inputs. They tested the model empirically for a sample of ten industrialized and semi-industrialized developing countries using a 'calibration' method to estimate the parameters of the model for each country. Their model yields an expansionary effect of devaluation for eight out of ten countries. They conclude that the view that devaluations cause stagflation does not find empirical support, because the expenditure switching effects seem to outweigh the supply side contractionary effects.

Gylfason and Risager (1984) construct a model for a small country, where devaluation affects external debt via changes in interest payments. In addition to introducing the channel of interest payments, they bring in external debt as a negative portion of wealth. This way, they create a new channel for a negative effect on demand. At the same time they are the first to make a distinction between private and public external debt. The use of their imputed parameter data for seven developed countries and eight developing countries leads them to conclude that, although devaluations are typically expansionary for developed countries, they are likely to be contractionary in developing countries. A similar result is obtained by Gylfason and Radetzki (1985) for a larger group of developing countries, in a model emphasizing the role of wage indexing.

Wijnbergen (1986) constructed a model with intermediate goods and curbed financial markets. He studies the impact of devaluation on the aggregate supply as a result of three major factors: domestic currency costs of intermediate inputs; wage indexation when food imports are considerable; and shranked real credit for domestic firms needing funds to finance working capital. He finds these channels contractionary for the supply side and considers this outcome even more harmful than a demand-side contraction (Krugman-Taylor) where at least the price level declines. Wijnbergen argues that when devaluation results in stagflationary pressures, the ultimate aim of stronger competitiveness that devaluation is meant to attain may be jeopardized. Since in his model, households hold no foreign assets, a nominal devaluation raises the domestic interest rate and thus the real debt service burden, reducing aggregate demand. His policy implication entails, that upon the introduction of the supply side channels, the likelihood of devaluations becoming contrac-

tionary increases, even when aggregate demand expands. This would be precisely the case when expenditure-switching effects dominate expenditure-reducing effects.

Buffie (1986a) presents a model of domestic good production using labour, a fixed factor, and an imported input. His model has no imported consumer goods, and exports of the domestic good are only a function of its relative price. Buffie derives the trade balance by means of a saving function. The real value of saving depends on the excess real money demand or supply. An adjustment of real wages and the money supply is built into the model. The comparative-statics of his model pointed to an ambiguous effect of devaluation on the level of employment, while the condition for local stability in some special cases is necessary to exclude a contractionary effect on output.<sup>5</sup>

Lizondo and Montiel (1989) set up a general analytical framework aimed at providing the major components of a comprehensive model that would bring to light the relationship between the exchange rate and real output. They study the case of a small open economy that employs homogeneous labour, sector-specific capital, and imported inputs. While suggesting that most of the analytical frameworks in the literature need revision they note that 'In principle ... we cannot unambiguously determine whether a devaluation will generate sufficiently favorable effects on the demand for non-traded goods as to overcome the clearly adverse supply side effects.'

Gylfason and Radetzki (1991) analyze the short and medium-term effects of devaluation on macroeconomic performance in the least developed countries. Their analysis is built upon downward rigidity of real wages or earnings. In their model, devaluation affects the current account and real GNP by way of exports, imports, and expenditures on the demand side of the economy, plus, through the cost of imported inputs from the supply side. Their simulation outcomes for 12 least developed countries speak in favour of the contractionary devaluation for most of the countries considered. Moreover, this contractionary influence on output and employment is amplified under wage indexation. Agenor (1991) uses a formal model of output determination and estimates it on annual data for a cross-section of 23 developing countries over the period 1978-87. He places significant importance upon the adequate formulation of the relationship between output and real exchange rates under rational expectations. The estimates suggest that an anticipated real depreciation has contractionary effects, whereas an unanticipated real depreciation boosts output growth. Agenor finds that the contractionary impact of anticipated depreciations persists for periods longer than a year.

Beyond these multi-country studies, the literature has a number of country-specific papers. Recognizing the significance of such models, Khan (1990, p. 226) noted that, '[c]ase studies permit one to delve deeply into the specifics of program design and implementation, and to identify special circumstances surrounding the program.' In this context, Solimano (1986) constructs a macro model for Chile that focuses on two factors: (a) some features of the

semi-industrialized economies with regard to the elasticities of supply for exports and demand for imports, which cause trade flows in the short-run to be rather insensitive to changes in relative prices; (b) the effect of devaluation on domestic costs and competitiveness, via the cost of imported inputs as well as its impact on wages under a system of wage indexation. He notes that foreign trade elasticities, the cost structure of traded goods, and the behavior of nominal wages will play a crucial role when it comes determining the effects of devaluations on output and employment. His simulations for the Chilean economy testify that devaluation is contractionary in the short to medium-run.

Branson (1986) develops a two-sector model for Kenya with sticky prices, imported intermediate goods, and wage indexation. According to Branson imported capital goods constitute a sizeable portion of any new investment in developing countries. He then contends that a real depreciation will make capital more expensive in terms of home goods, which in turn will lead to less new investment and thus a contraction of aggregate demand. Branson's small simulation model, suggests that devaluation has considerable stagflationary results in Kenya. Taylor and Rosensweig (1984) made use of a large computable general equilibrium model for Thailand. Among a series of policy measures, they simulated the effects of devaluation. According to their results, a devaluation of the baht will generate a real output expansion of about 1 percent for a 3 percent devaluation.

Roca and Priale (1987) have assembled a detailed macroeconomic model in order to assess the experience of Peru with devaluation over the periods 1977-78 and 1980-82. Peruvian authorities implemented large nominal devaluations in an attempt to improve the external balance. In the case of Peru, a substantial share of the business sector debt was owed back in US dollars. Thus the consecutive nominal devaluations gave rise to two phenomena: (a) higher prices for imported inputs; and (b) increased cost of credit that led to a higher cost of working capital for heavily indebted companies. They conclude that, ultimately, these two factors produced a severe stagflationary effect. Finally, Teye (1999), in an attempt to evaluate the impact of devaluation on the macroeconomic performance of a subsistence economy, takes up the case of Ethiopia. He uses a medium size macro-econometric model for data simulations and observes that although there is improvement in the current account position, the economy experiences stagflation. The author contends that the expenditure-reducing effects dominate the expenditure-switching effects of devaluation, which signals that the improvement in the external sector stems from lower imports rather than from an output expansion.

Macro-simulation studies, unlike factual approaches, play a valuable role in the process of gaining more insight into the mechanics of how exchange rates influence aggregate output. Nevertheless, their Achilles heel is in the use imputed parameter values. As Agenor (1991) put it '[t]he reliability of results derived from a set of "guesstimates" and coefficients that are not consistently

estimated in an integrated framework can rightly be questioned.' The Lucas critique suggests that the parameters used in the theoretical models, which are obtained from econometric models, will likely vary with changes in the policy regime. Consequently, assuming these parameters as rigid across different policy simulations would be quite unrealistic and thus bias the results. Khan (1990) observes another limitation of the simulation approaches in that they cannot incorporate any credibility aspects associated with the implementation of the policy packages. Undeniably, the outcomes of a certain policy package can be very different depending on whether it is implemented under an IMF program or independently by the country's authorities. This particular drawback can be overcome with outcome-based approaches or econometric studies, which are discussed next. Table 1 summarizes the relevant simulation studies by author, year of publication, in terms of contributing factors and other features.

**Table 1: Features of major macro-simulation studies on contractionary devaluation**

<i>Author, Year</i>	<i>Type of model</i>	<i>Contractionary factors</i>	<i>Other characteristics</i>
Diaz-Alejandro, 1963	Demand-side	1) Redistribution of income	Marginal propensity to <i>spend</i> ; potentially contractionary
Cooper, 1971a	Demand-side	1) Redistribution of income 2) Debt service payments	Importance of the time horizon; potentially contractionary
Cooper, 1971b	Demand/Supply-side	1) Redistribution of income 2) Initial trade deficits	Foreign aid; potentially contractionary
Krugman, Taylor, 1978	Demand/Supply-side	1) Redistribution of income 2) Low government marginal propensity to spend 3) Initial trade deficits	Hypothetical country simulation; potentially contractionary
Bruno, 1979	Demand/Supply-side	1) Reduction in real wealth 2) Higher nominal interest rates 3) Price of imported inputs 4) Cost of working capital	Semi-industrialized economies; segmented credit market; potentially contractionary
Gylfason, Shmidt, 1983		1) Reduction in real wealth 2) Price of imported inputs 3) Wage indexation 4) Elasticities of demand for exports/imports 5) Share of final goods imports in GDP 6) Share of factor imports in GDP	Industrialized and semi-industrialized economies; Mostly expansionary

**Table 1** continued...

Hanson, 1983	Demand/Supply -side	1) Reduction in real wealth 2) Price of imported inputs 3) Wage indexation 4) Elasticities of demand for imports 5) Initial trade deficits	Expansionary devaluations in the Southern Cone of Latin America
Gylfason, Risager, 1984	Demand/Supply -side	1) Debt service payments 2) Price of imported inputs 3) Wage indexation	Expansionary in developed countries; Contractionary in developing countries
Islam, 1984	Demand/Supply -side	1) Price of imported inputs 2) Wage indexation 3) Initial trade deficits 4) Foreign aid	Substitution in production and consumption; potentially contractionary
Branson, 1986	Demand/Supply -side	1) Investment contraction 2) Price of imported inputs/capital 3) Wage indexation	A simulation for Kenya - contractionary
Solimano, 1986	Demand/Supply -side	1) Price of imported inputs 2) Wage indexation 3) Elasticities of demand for exports/imports	A simulation for Chile - contractionary
Wijnbergen, 1986	Demand/Supply -side	1) Investment contraction 2) Debt service payments 3) Higher nominal interest rates 4) Price of imported inputs 5) Cost of working capital 6) Wage indexation	Curb markets; potentially contractionary
Barbone, Rivera-Batiz, 1987	Demand-side	1) Increased foreign profit	A simulation for Jamaica - potentially contractionary
Gylfason, Radetzki, 1991	Demand/Supply -side	1) Reduction in real wealth 2) Price of imported inputs 3) Wage indexation	Contractionary in developing countries
Taye, 1999	Demand/Supply -side	1) Price of imported capital and inputs 2) Government deficit financing 3) Capacity utilization rate 4) Indirect taxes	A simulation for Ethiopia - contractionary

## 5. ECONOMETRIC APPROACH

Econometric studies constitute a rather sparse component of the literature on contractionary devaluations when compared with the macro-simulation studies. Connolly (1983) uses cross-section data for a group of 22 countries to examine the impact of nominal exchange rate changes on the change of the real output growth rate. The results of his regression analysis lend support to the expansionary devaluation hypothesis. One of the most prominent early econometric studies is Edwards [1986a] who estimates a fixed effects model of real output based on pooled data for 12 developing countries over the period 1965-80. Edwards extends and modifies a model of real output behavior by Khan and Knight (1981) to include the terms of trade ( $\tau$ ), the ratio of nominal government spending to nominal income ( $GE/Y$ ), a monetary surprise variable,<sup>6</sup> the real exchange rate ( $e$ ), and a country dummy variable ( $v_n$ ) as in equation (1):

$$\begin{aligned} \log y_t = & \gamma_n \text{time} + \beta_1 \log(GE/Y)_{nt} + \sum_{i=0}^2 \beta_{2i} [\Delta \log M - \Delta \log M^*]_{n,t-i} \\ & + \sum_{i=0}^2 \beta_{3i} \log \tau_{n,t-i} + \sum_{i=0}^2 \beta_{4i} \log e_{n,t-i} + v_n + \varepsilon_m \end{aligned} \quad (1)$$

The inclusion of lagged values is meant to capture the short and long-run effects of the respective variables on real output. This would be a test of the hypothesis that considers the contractionary effect of devaluation as merely a short-run phenomenon. His results confirm the expected positive effect of monetary surprises and government spending on output, while finding the terms of trade variable to be statistically insignificant. On the other hand the regression produced a contractionary effect on output for the contemporaneous real exchange rate. However, the lagged value of the real exchange rate showed an offsetting expansionary effect. Edwards concludes that, even though devaluations will reduce output in the first year, this effect would be completely offset during the second year, rendering devaluations neutral in the long-run. Another study by Edwards (1989b) adopts a multi-sector macro model with imported intermediate goods, wage indexation and foreign debt to assess the effect of devaluations on total domestic output and employment. Edwards derives a testable reduced form equation from his macro model, which he then modifies in various ways to make it suitable for regression analysis. Panel data regressions are run for 12 developing countries with annual data covering the period 1965-84. His results are mostly consistent with his previous conclusions (Edwards, 1986a) that devaluations are contractionary in the short-run, however they remained neutral for the long-run only in two cases.

Sheehy (1986) assumes a Lucas-type supply function, to analyze the short-run effect of unanticipated inflation, changes in the relative cost of for-