

Temporary and Permanent Terms of Trade Shocks: A
Literature Survey

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1 Introduction

The theory of terms of trade is a fundamental theory of change in income and its consequences on the economy. On impact, there is a shift in real income and therefore a deterioration or improvement in real income accordingly. By studying the outcomes of terms of trade shocks, we are able to examine the macroeconomic implications of changes in income. Terms of trade changes could be sudden or anticipated, negligible or significant. Due to the structure of their economies, many terms of trade changes in developing countries often constitute shocks, with diverse ramifications for their economies. The consequence of the change in terms of trade on the macro-economy in general and government budget deficits in particular depend on policy response via the trade balance. Based on different macroeconomic parameters, the precise outcome of terms of trade shocks will depend upon the relative speed with which the economy responds to the gain or loss in real income (Afolabi and Bladden – Hovell, 1990; Gavin, 1990).

In the above context, it is crucial whether the terms of trade shock is expected or non expected, huge or minimal. Unexpected increases or decreases in income following terms of trade shocks raises fundamental questions. Will it be temporary or permanent? Should government expenditure plans be altered and if so, to what extent will these adjustments have to be made? What happens to government budget deficits and how would they be financed? How do fiscal balances behave during the different phases of world trade cycles? Given the institutional dependence of revenue on external developments, how did government expenditure behave during trade and fiscal cycles? How does expenditure respond to anticipated and unanticipated external shocks? How does and should the current account respond to changes in terms of trade? How does saving respond to terms of trade changes? Generally, answers to

these questions depend on expectations based on the assumptions made about the pattern of terms of trade.

Many studies of terms of trade movement have addressed some of the above questions. These studies have two main dimensions. The first dimension depicts the behaviour of non-boom sectors in the event of significant positive terms of trade changes engineered by a booming sector in the same economy. Often known as the Dutch disease, the works of this nature include Bruno (1982), Buitier and Purvis (1982), Fardmanesh (1991), Corden and Neary (1980), Forsyth and Kay (1980), Neary and Purvis (1981), Nyatepe-Coo (1994) and Bruno and Sachs (1982). In addition, this area covers country's adjustment efforts to changes in terms of trade, and evaluate the effects and influences of movements in terms of trade on macroeconomic aggregates and variables, such as budget deficits, and adjustment policies necessary to mitigate declining or take advantage of improving fortunes (see for instance, Gavin, 1990; 1991; 1993; and Little et al, 1997).

The second dimension, which is our focus, is mainly concerned with the savings response of the economy and current account behaviour to terms of trade movement. The starting point is the works of Harberger (1950) and Laursen and Metzler (1950). The papers, which went largely unchallenged until the 1980s, both conclude that savings will fall in response to deterioration in terms of trade and vice versa. However, the international macroeconomic evidence of the 1970s provided a background to question the theoretical assumptions and foundations of these papers. Such macroeconomic evidence stimulated influential papers such as Sachs (1981, 1982), Obsfeld (1982), Svensson and Razin (1983), Svensson (1984), Marion and Svensson (1984a and b), Persson and Svensson (1985), and Matsuyama (1988). With these papers, there is now a consensus that savings and current account behaviour should be given intertemporal considerations.

There are four sections in this paper. The next section, which is section 2 is divided into two sections, and examines the literature on savings and current account behaviour in response to terms of trade changes. Section 2.1 considers the response of savings and current account when there is a temporary terms of trade changes, while section 2.2 looks at the response of savings and the current account when terms of trade shock is permanent. The analysis of the above sections raises important issues about the role of consumption pattern in the determination of the direction of savings and current account in response to terms of trade shocks. This is considered in Section 3, while section 4 concludes.

2 Terms of Trade, Savings and the Current Account Behaviour

A change in terms of trade will be followed by a shift in real income. A deterioration or improvement in terms of trade will result in a change in real income accordingly. The effect of the resulting changes in real income will depend on how the economy reacts to such changes. Harberger (1950), in discussing the effect on the trade balance of a devaluation and Laursen and Metzler (1950) – in discussing the transmission of disturbances in a two-country world with endogenous terms of trade and balanced trade (which they identified with flexible exchange rate regime) – looked at the effect on spending, measured in home goods, of terms of trade changes, asserted that deterioration in terms of trade would result in a decrease in savings while an improvement will lead to an increase in savings. Therefore, deterioration in terms of trade will be followed by deterioration of the current account and vice versa. As more real income accrues to the economy, following positive terms of trade, the economy has more income and can, therefore, increase savings.

Besides a discussion of the relationship between terms of trade and permanent of payments from a monetary approach perspective (Rodriquez, 1976), the Harberger-Laursen-Metzler (HLM) view, that

deterioration in terms of trade will be followed by reduction in savings went unchallenged for three decades. The macroeconomic evidence of the 1970s, anchored on the phenomenal increases in oil prices during the decade provided a basis for examining the HLM assertion in detail. The evidence stimulated papers such as Sachs (1981, 1982), Obsfeld (1982), and Svensson and Razin (1983) in exploring the microfoundations of the HLM effect in an intertemporal optimisation framework.

After considering the HLM view in detail, it was realised that the theoretical foundation of the HLM view is the static Keynesian analysis of a stable consumption income relationship. That is, a constant percentage of income is consumed out of a given income. However, when savings behaviour is given intertemporal considerations, it opens up a wide array of conceivable dimensions of terms of trade shocks on savings and the current account, which has spurred a great deal of research on the response of savings and current account behaviour to terms of trade changes, based on expectations and intertemporal allocations of resources.

2.1 Temporary Terms of Trade Shocks and Savings Behaviour

There is a major difference between temporary and permanent terms of trade shocks. By assuming that economy is subjected to temporary terms of trade shock means the terms of trade reverses, after a certain period of time, to its original position, whereas there exist a permanent reduction or improvement in the case of a permanent terms of trade shock. However, for theoretical and analytical purposes, it is important to make clear-cut assumptions about expectations and the time scope. For instance, in circumstances of continuous fluctuations and uncertainty in terms of trade, separating temporary and permanent terms of trade shocks might be difficult. In such circumstances, the distinction between the analytical responses to temporary and permanent terms of trade shocks becomes ambiguous.

The theoretical distinction between temporary and permanent terms of trade changes have generally been made in two period setting models (for instance, Sachs, 1981; Svensson and Razin, 1983) and multi-period setting intertemporal models (for instance, Obstfeld, 1982; Svensson and Razin, 1983; Persson and Svensson, 1985; Matsuyama, 1988). The characterisation of temporary terms of trade shocks is straightforward in a two period setting. The shock takes place in the first period, and reverses to the original level in the second period. The impact is felt in the first period but do not persist into the second period, though through intertemporal allocation, the accommodation of the shock may continue into the second period. However, the dynamic responses to terms of trade shocks are more tractable in a multi period setting.

The standard assumptions for the analysis of temporary terms of trade shocks are the exogeneity of such shocks and given interest rate. Other assumption include constant rate of time preference (for instance, Sachs (1981), signified by the adoption of a Cobb-Douglas production intertemporal utility function. In Sachs (1981), the terms of trade shock emanate from the changes in the price of an intermediate input, oil, while the price of the exporting final good is unchanged. For given interest rates and constant rate of time preference savings deteriorate for a temporary terms of trade deterioration. Temporary terms of trade deterioration implies a temporary fall in income and, by intertemporal consumption smoothing, consumption falls by less, which deteriorates the current account.

While Sachs (1981) suggested in broad terms the direction savings will follow in response to terms of trade deterioration, Svensson and Razin (1983) decomposed the avenues through which terms of trade changes will affect savings and the current into three. The avenues are through the revaluation of net exports, through wealth effect on spending and through intertemporal substitution effects. The terms of trade change has direct effects on consumption and aggregate expenditure through the change in the value of net exports, wealth effects through the change in real income

and substitution effects through the changes in relative prices. The overall outcome on savings and the current account will depend on expectations and the time scope for changes to consumption patterns.

Svensson and Razin argue that the relative size of the marginal propensity to spend, in the present and in the future is important for the effects of terms of trade changes on the current account. They show that temporary current (future) terms of trade deterioration imply a deterioration (improvement) of the trade balance. Pure substitution effect on consumption, in general gives an ambiguous sign. Though the direct plus wealth effect is unambiguously negative (positive) for temporary (permanent) terms of trade deterioration. Temporary terms of trade changes cause a change in real income and real interest rate. Svensson and Razin also include consumption substitution effects and show, by assuming suitable separability of the preferences, how the static and intertemporal substitution effects can be organised in terms of changes in consumer price indices and real interest rate. The dynamic effects of temporary terms of trade shock are therefore consistent with the classic HLM analysis.

Persson and Svensson (1985) also study the current account dynamics resulting from the savings and investment dynamics in a small open economy with exogenous changes in commodity terms of trade and world interest rate. Disturbances in the terms of trade may generate complicated current account dynamics because of the interaction between tilted consumption patterns and accumulation of capital. The tilted consumption patterns and accumulation of capital draw implications from labour supply and production. Indeed, Bean (1986) extended in details this line of argument. Bean analyses show that a change in terms of trade alters the relationship between the product wage, which is relevant to the firm's labour demand decision and the consumption wage, which is relevant to the worker's labour supply decision. It will also induce a wealth effect on the labour supply (output).

On his part, Matsuyama (1988) adds another dimension to the response of savings to terms of trade fluctuation. While Sachs (1981), Svensson and Razin (1983), Persson and Svensson (1985), and Bean (1986) all agree that the avenue for savings response to terms of trade fluctuations are through the reduction in wealth and real income, and through the interest rate changes, Matsuyama (1988) considers a third route through which the savings response to terms of trade fluctuations might affect the determination of the current account. In an overlapping generations model without bequests, Matsuyama provide arguments that the terms of trade deterioration will impact particularly on factor of exportable production. Therefore, in a capital-intensive exportable sector, terms of trade deterioration will improve human capital relative to physical capital. At the same time when the export sector is labour intensive, a terms of trade deterioration is also a rise in the relative price of capital intensive goods. Therefore, wage income and savings decline. On the other hand, the value of capital rises and, therefore, the foreign asset holding of the economy decrease: there is a current account deficit. In the context, the crucial message in the paper is that the effects of terms of trade on changes in foreign asset holdings depend on factor intensities of the two sectors, as in Engel and Kletzer (1989).

Matsuyama calls this effect the Stoper – Samuelson effect. In a standard two- sector production setting where the two primary factors are labour and capital, a terms of trade deterioration reduces (increases) the value of human wealth and increases (reduces) the value of capital, when the export (import) sector is more labour intensive. This does not affect the economy when human and non-human wealth are perfect substitutes (infinitely identical consumers). However, significant changes in the pattern of savings can result in an economy where consumers are finitely lived and follow the life cycle model of savings (with the result that aggregate human and non-human wealth are imperfect substitutes).

Finally, in contrast to many of the papers surveyed above, van Wijnbergen (1985) incorporated disequilibrium labour and goods market,

thereby enabling the analysis of the classical and Keynesian unemployment. According to the paper, the improvement in the current account is clearly counterfactual. Theory and practice can be reconciled by pointing out that OPEC surpluses will force the rest of the world to run current account deficits whatever their ex ante desired positions. Bruno (1982), Sachs (1981) and Marion and Svensson (1981) have interpreted the low real interest rates that prevailed throughout most of the seventies as evidence for this line of reasoning. By modifying the model of Bruno (1982), it is shown that the response to an oil price shock will be a deterioration of the current account, accelerated gross investment, as in Sachs (1981) and Svensson (1984) and scrapping of old capital in response to an oil price shock.

As far as the HLM effect was concerned, the key insight provided by these models was that the relationship between the terms of trade and saving depended crucially on the expectation duration of the terms of trade shock (Ostry and Reinhart, 1992). For example, if households expected an improvement in the terms of trade shock to be permanent, then they would revise upward their estimate of permanent income in proportion to the increased purchasing power of their income today. Under the hypothesis that the marginal propensity to consume (save) out of permanent income is unity (zero), a permanent change in terms of trade would therefore have no effect on saving, contrary to the HLM view. By contrast, in a situation in which the improvement in the terms of trade was expected to be only temporary, the increase in permanent income would be smaller than the increase in current income, and saving would accordingly rise. Therefore, the HLM hypothesis was satisfied for transitory terms of trade disturbances, but apparently not for permanent ones.

2.2 Permanent Terms of Trade Shocks and Savings Behaviour

The dynamic responses of an economy to permanent terms of trade changes are quite important because the terms of trade will not revert to the initial level. If significant, there are important macroeconomic policy decisions that need to be made in order to take advantage, if positive, or mitigate, if negative. Compared to temporary terms of trade shock, there are wider possibilities in the macroeconomic response to permanent change in terms of trade. Therefore, the conduct of fiscal, monetary and wider macroeconomic management is crucial. For instance, the stationary state response to permanent terms of trade deterioration will cover the whole price indices of interest rates and exchange rates, and production structures relating to both traded and non-traded goods, making temporary and long term adjustment of relative prices and realistic expectations important.

As in the case of temporary terms of trade shocks, analysis of permanent terms of trade change assume exogeneity of terms of trade shocks and given interest rates. In general, however, the savings and current account response to permanent terms of trade change is ambiguous (Sachs, 1981; Svensson and Razin, 1983; Persson and Svensson, 1985). Indeed, Sachs (1981) argued that savings may remain unchanged for a permanent terms of trade deterioration. A permanent deterioration in terms of trade decreases both income and consumption to about the same extent and hence ambiguous effect on savings. In addition, Svensson and Razin (1983) consider the possibility of a different outcome. Consumption and investment both fall sharply on impact since opportunities for consumption smoothing are reduced and the decline in the present value of future marginal products of capital is now much larger. However, in the long term, this more pronounced fall in demand results in larger decline in imports, which can be big enough to produce the opposite of the HLM effect on impact as well.

A common feature in the literature on the response of savings and the current account to terms of trade changes is the importance of consumption preferences as it relates to the state of time preference. For instance, Svensson and Razin (1983) show that the response to terms of trade deterioration will be ambiguous, depending on the rate of time preference. If the rate of time preference decreases with the level of wealth, then the current trade balance will deteriorate and vice versa. When the infinite horizon scenario is considered, the assumption of an increasing rate of time preference is shown to be crucial to the stability of the model. Therefore, the intertemporal substitution effects, which are ambiguous because they generate uncertainty in savings makes the permanent effect of terms of trade shock uncertain.

In contrast to Sachs (1981) and Svensson and Razin (1983), Obstfeld (1982) dealt extensively on the ambiguity of permanent terms of trade shocks, and discussed a peculiar intertemporal circumstance in which permanent terms of trade deterioration would generate improvement in the trade balance. Obstfeld also considered the impact of changes in income, resulting from terms of trade changes on savings and the current account. In contrast to HLM interpretation of a decline in savings in response to deterioration in terms of trade, Obstfeld concludes that a permanent deterioration in terms of trade will actually improve the current account. That is, an unanticipated, permanent worsening of the terms of trade occasions a surplus rather than a deficit in the current account, implying that when net claims on future units of the foreign good are zero, aggregate spending measured in units of the domestic good must fall. The assertion is that the economy has an expected target level of real wealth, which is at the point where the rate of time preference is equal to the given world rate of interest. In order to maintain the target level of real wealth, saving would have to increase when there is a terms of trade deterioration by increasing foreign assets.

These results show the differences in the response of saving, investment and the trade balance to temporary and permanent oil price

increases. The results also show that for a permanent oil price increase, the trade balance may somewhat, paradoxically, improve unless the rate of interest falls. This definite prediction of an increase in savings and the current account in response to terms of trade deterioration is, however, based on the assumption of a subjective rate of time preference due to Uzawa (1968). Indeed, the results of the model are derived by specifying the rate of time preference as an increasing function of utility. Therefore utility increases with welfare. In addition, the model considers permanent terms of trade deterioration leaving the interest rate constant in an initial stationary state, and also assume that preferences are homothetically weakly separable (see Svensson, 1984). Therefore, different assumptions about the structure of preferences and the range of assets may yield different results.

Corroborating Obstfeld (1982), Persson and Svensson (1985) conclude that the HLM effect indeed can be of either sign for possible parameters, both for temporary and permanent terms of trade deterioration. The paper reports a cyclical adjustment of the current account for anticipated, unanticipated, temporary and permanent changes in the current account. What lies behind this is the fact that terms of trade changes thus generate fluctuations in investment goods real rate of interest, which implies cycles in investment, which with a lag, lead to cycles in wages and income. Induced cycles in consumer real rates of interest lead to cycles in savings, as do the lagged cycles in income. Altogether, this gives cycles in the current account.

In summary, therefore, whether savings and the current account will deteriorate or improve in response to deterioration or improvement in terms of trade will depend on the consumption patterns that follow such shocks. This further depends on preferences and other consumption parameters; we now turn to these issues in the next section.

3 Consumption Patterns in response to Terms of Trade Shocks

In the last two sections we discussed that the responses of savings and the current account to changes in terms of trade could be definitive (sometime ambiguous, Ostry and Reinhart, 1992) for temporary terms of trade, and ambiguous for permanent terms of trade. In addition, it is mentioned that the whole response of savings and the current account to terms of trade changes depend on consumption patterns in the economy, which further depend on consumption preferences.

In general, consumption pattern is governed by the intertemporal elasticity of substitution. That elasticity can be measured by the response of the rate of interest of consumption to changes in the expected real interest rate (Hall, 1978). A higher expected real rate of interest makes consumers defer consumption, everything else held constant. Relatively large values of this parameter imply that in response to a given (transitory) movement in the terms of trade and hence in the intertemporal relative price (consumption rate of interest), consumers increase their saving by a relatively large amount; it follows that the larger is this elasticity, the greater is the increase (the smaller the fall) in private saving in response to a transitory adverse shock to the terms of trade.

Empirical studies of the elasticity of intertemporal substitution, aimed at explaining the pattern of consumption in response to expectations of real interest rates, are inconclusive. While Hansen and Singleton (1975) reached the conclusion that elasticity of intertemporal substitution is positive for the US, Hall (1978) reached an opposite conclusion. Other studies include Dornbusch (1983), which provide analytical interpretations of elasticity of intertemporal substitution and consumption patterns, while Ostry and Reinhart (1992) carried out measurements for different regions of the world and reached conclusions in consonance with Hansen and Singleton.

Due to the uncertainty in consumption patterns, it is almost impossible to predict savings and current account behaviour in response to increase or decrease in income resulting from terms of trade changes. For instance, Persson and Svensson (1985) asserted that there are arrays of current account dynamics due to the possibilities of consumption patterns. Central to these arrays of possibilities is the assumption of how interest rate changes will affect the economy's savings plan. In addition, Lucas (1976) argued that there may not be anything that could properly be called consumption or savings function. Effectively, consumption and savings respond to a wider macroeconomic situation, rather than a stable consumption – income relationship over time even though consumers are trying to maximise the same utility function. Therefore, the basis for intertemporal smoothing of consumption, and therefore, the classic HLM view is called into question.

Therefore, by looking at consumption patterns and savings only through intertemporal smoothing of consumption, a lower rate of interest will result in increase in consumption whereas an increase in interest rate will make consumers defer consumption. While there have been lots of emphasis on the appropriate real interest rate, there is little mention of other variables that might affect consumption patterns, following terms of trade shocks. For instance, deterioration or improvement in terms of trade might result in deterioration or improvement in line with previous consumption patterns, or result in a shift in consumption patterns.

Hall (1978), for instance, argued that consumers plan to change their consumption from one year to the next by an amount that depends on their expectations of real interest rates. Actual consumption will differ from planned consumption by a random variable that indexes all information available in the next period that was not incorporated in the planning process in the preceding period. Unexpected terms of trade movement, not taking into consideration in the previous period will result in a corresponding shift in consumption for given interest rates. That is, if expectations of real interest rate shift, then there should be a

corresponding shift in the rate of change of consumption. The magnitude of the response of consumption to a change in real interest expectations measures the intertemporal elasticity of substitution.

However, the most forceful argument as a basis for an ambiguous result on the response of savings and the current account to terms of trade fluctuations, due to consumption patterns uncertainty is due to Ostry and Reinhart (1992). Ostry and Reinhart argue that the view that temporary changes in terms of trade have unambiguous effect on savings is misleading for two reasons. First, savings might increase in response to terms of trade deterioration if consumption of importable goods is deferred. That is, saving should increase as agents reduce current consumption in line with the increase in its relative price (see also Dornbusch, 1983). A transitory adverse shock to the terms of trade raises the cost of current consumption relative to future consumption (the consumption rate of interest) because it temporarily raises the relative price of imports, which enters into the consumer price index. The latter, however, returns to its trend level once the terms of trade return to their trend level. The same argument could be made in the case of significant positive terms of trade. Current consumption increases relative to future consumption because current imports are relatively cheaper compared to future imports. On these suggestions, what happens to savings is theoretically ambiguous and depends on the relative magnitudes of the consumption preferences relating to intertemporal smoothing, and consumption tilting motives.

Second, in addition to intertemporal elasticity of substitution, there is the intratemporal elasticity of substitution, which governs the switch from imports to domestic goods. Ostry and Reinhart argue that terms of trade deterioration will result in the substitution of imported good with domestic goods. A relatively large values of this parameter implies a large increase in the consumption rate of interest and commensurately large increase in saving. It may be concluded, therefore, that the larger are the intertemporal or intratemporal elasticities of substitution, the greater will

be the increase (the smaller the decreases) in private saving in response to a temporary adverse movement in the terms of trade.

Finally, Ostry and Reinhart carried out measurements of intertemporal and intratemporal elasticity of substitution, using structural parameters of a representative household's utility function. In contrast to Hall (1978) and in consonance with Hansen and Singleton (1975), they find evidence that the intertemporal elasticity of substitution is positive, lays between 0.3 and 0.5, while intratemporal elasticities are estimated to be significantly higher. They, therefore, reckon that intratemporal elasticity of substitution plays a substantial role in the direction of the HLM effect in developing countries. The implication of the result is that consumer preference will dictate that the growth rate of consumption increases in response to expected increases in real rates of return. In addition, terms of trade shocks are likely to generate substantial fluctuations in real exchange rate, which in turn alter consumption rates of interest, thereby affecting saving behaviour and the allocation of total expenditure between traded and nontraded goods.

4. Concluding Remarks

In this paper I surveyed the literature on temporary and permanent terms of trade shocks and the response of savings and current account to such changes. Significantly, temporary terms of trade reverses to its initial position after a period whereas remains in the new position in the case of permanent changes. Overall, the savings and current response depends on consumption patterns in the economy and therefore ambiguous, particularly in the event of a permanent change because there is enough time for the whole dynamic changes to consumption pattern to take place. In summary, we are back to where we were. The direction of the HLM effect is generally ambiguous, and rather it is an empirical matter.

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