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Abstract

This paper investigates the role of aggregate demand elasticity for the balance of trade when economic expansion occurs. Our conclusions are two. First, when an economic expansion results from an increase of aggregate demand, the balance of trade deficit is larger the less elastic is aggregate demand with respect to the general price level. Second, when an economic expansion happens from an increase of short-run aggregate supply, the price level elasticity of aggregate demand determines both the direction of change of the balance of trade and the size of the resulting deficit or surplus. We show here that a relatively elastic aggregate demand can result in a balance of trade deficit while a relatively inelastic aggregate demand can yield a balance of trade surplus.

Keywords

Balance of trade, aggregate demand, aggregate supply, price level elasticity

Disciplines

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ECONOMIC EXPANSION AND THE BALANCE OF TRADE: THE ROLE OF AGGREGATE DEMAND ELASTICITY

by Ben L. Kyer* and Gary E. Maggs**

Abstract

This paper investigates the role of aggregate demand elasticity for the balance of trade when economic expansion occurs. We have two conclusions. First, when an economic expansion results from an increase of aggregate demand, the balance of trade deficit is larger the less elastic is aggregate demand with respect to the general price level. Second, when an economic expansion happens from an increase of short-run aggregate supply, the price level elasticity of aggregate demand determines both the direction of change of the balance of trade and the size of the resulting deficit or surplus. We show here that a relatively elastic aggregate demand can result in a balance of trade deficit, while a relatively inelastic aggregate demand can yield a balance of trade surplus.

Keywords: balance of trade, aggregate demand, aggregate supply, price level elasticity

JEL Codes: F10, F41, A20

I. Introduction

The United States has incurred a deficit in its balance of trade for each year since 1976. Moreover, for the time period from 1991 to 2005, this deficit was generally increasing, both absolutely and as a percentage of gross domestic product.¹ Explanations of this particular trend are numerous and varied and include increasing income in the United States, decreasing foreign demand, increasing trade deficits with China, large trade deficits with oil exporting nations, increasing oil prices, a decrease of the private saving rate in the United States, large and increasing US federal government budget deficits, increasing American productivity growth, increased purchases of US assets by foreigners, and improvements of global financial intermediation.²

The price level elasticity of aggregate demand is a concept which has been overlooked in both macroeconomic textbooks³ and the research literature⁴ but is a relevant influence for the balance of trade and changes in the size of the trade deficit or surplus. Specifically, for any exogenous change

of aggregate demand or short-run aggregate supply, the resulting changes of real gross domestic product, the price level and, therefore, the balance of trade are affected by aggregate demand elasticity. The purpose of this paper is to demonstrate, with a graphical analysis, the implications of the price level elasticity of aggregate demand for the balance of trade when an economic expansion occurs.⁵

The paper proceeds as follows. Section II presents the analysis. We examine the role of aggregate demand price level elasticity for the balance of trade when an economic expansion happens as a result of either an increase of aggregate demand or an increase of short-run aggregate supply. Section III concludes the paper with a brief summary of the results.

II. The Analysis

The analysis in this paper is based on a number of standard assumptions. First, we assume that the aggregate demand for final goods and services depends negatively on the price level. This

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assumption follows from the familiar real balance, interest rate, and international effects, and these may be used to logically explain why aggregate demand may exhibit different price level elasticities. For example, and with respect to the real balance effect, also called the real wealth effect, the money wealth effect, and the Pigou effect, aggregate demand will be more elastic for any given change in the price level the more responsive is consumption spending to the resulting change in real wealth, *ceteris paribus*. For the interest rate effect, known also as the Keynes effect, aggregate demand is more elastic with respect to the price level when investment spending is more responsive to changes in the interest rate. Finally, and in regard to the international effect, alternatively known as the net exports effect, the balance of trade effect, the foreign purchases effect, the exchange rate effect, and the Mundell-Fleming effect, aggregate demand is more elastic the more responsive are exports and imports to changes in the domestic price level.

The second assumption is that any difference in the price level elasticity of aggregate demand for this paper arises only from either the real balance or interest rate effect, with the corollary being that the price level sensitivity of the balance of trade is assumed equal for aggregate demand curves of different price level elasticities. Third, we assume that any shock to aggregate demand originates domestically from consumption, investment, government purchases, taxes, money demand or money supply. In other words, the net exports function is, in essence, exogenously stable or constant. The fourth and fifth assumptions follow closely: that the exchange rate is fixed and the balance of trade depends negatively on domestic income or real gross domestic product. Finally, we assume that the aggregate supply of final goods and services is a positive function of the domestic price level. This assumption frames the analysis within the neoclassical synthesis in which there is some degree of wage or factor price rigidity in the economy. With these assumptions we analyze the importance of aggregate demand elasticity for the balance of trade when economic expansion occurs.

A. An Increase of Aggregate Demand

An economic expansion or increase of real gross domestic product may obtain of course because of

either an increase of aggregate demand or an increase of short-run aggregate supply. In Figure 1 we examine the influence of aggregate demand elasticity on the balance of trade when an economic expansion occurs as the result of an increase of aggregate demand. This aggregate demand increase may arise from decreased saving or a federal government budget deficit, factors cited for the large and increasing trade imbalances of the United States. Panel A of Figure 1 shows the standard aggregate demand, short-run aggregate supply model expanded to include two aggregate demand curves of different price level elasticities. Because these two curves pass through the same point, the flatter represents the greater elasticity and is labeled AD^{EL} while the steeper and more inelastic aggregate demand is AD^{IN} . An original short-run aggregate supply curve is constructed to intersect both aggregate demand curves at E_0 and establish the initial equilibrium price and real gross domestic product levels, P_0 and Q_0 , respectively.

Panel B of Figure 1 shows the balance of trade or net exports X^N as a negative function of real gross domestic product since total exports are normally assumed exogenous while total imports are endogenous and depend positively on real income. With the economy in equilibrium at Q_0 , we assume for simplicity that the balance of trade is zero at E_0' . Now assume that a positive aggregate demand shock occurs and shifts both aggregate demand curves horizontally by the distance E_0X .

When short-run aggregate supply is positively sloped, an increase of aggregate demand increases the price level and real gross domestic product, both of which cause the balance of trade to move into deficit. In other words, the direction of change of the balance of trade is known. However, as shown in Figure 1, the increases of the price level and real income and therefore the size of the balance of trade deficit depend crucially on the price level elasticity of aggregate demand. Specifically, when aggregate demand is elastic, the increase in real gross domestic product, from Q_0 to Q_1 , causes by itself a trade deficit of Q_1A . In addition, the small increase of the price level, from P_0 to P_1 , shifts the net export function downward by the relatively small amount, say, AE_1' , such that the total balance of trade deficit is Q_1E_1' . By contrast, when aggregate demand is inelastic, the changes of both real gross domestic product and the price level are larger with

FIGURE 1. Panels A and B

FIGURE 2. Panels A and B

a resulting larger deficit in the balance of trade. In this case, the increase of real GDP from Q_0 to Q_2 increases the trade deficit to Q_2B , and the larger increase of the price level, from P_0 to P_2 , shifts the net exports function downward by a greater amount than before, or the distance BE_2' , given the assumption of equal net export elasticity with respect to the general price level, and the total trade deficit is given as Q_2E_2' . The conclusion for an economic expansion caused by increased aggregate demand is unambiguous: the balance of trade deficit is larger the less elastic is aggregate demand with respect to the general price level.

B. An Increase of Aggregate Supply

We now consider the significance of aggregate demand elasticity for the balance of trade when an economic expansion results from an increase of aggregate supply. This increase of aggregate supply might be caused, for example, by increased productivity growth, another factor cited for the large trade imbalances of the United States from 1991 to 2005. Panel A of Figure 2 again shows the standard aggregate demand, aggregate supply model expanded with two aggregate demand curves of different elasticities, labeled as before. An initial aggregate supply curve is drawn to intersect these two aggregate demand curves at E_0 such that the starting equilibrium price and real gross domestic product levels are P_0 and Q_0 , respectively. As before, we assume for convenience that net exports is zero, as shown by E_0' in Panel B. Now suppose that aggregate supply increases from $SRAS_0$ to $SRAS_1$.

For any given increase of aggregate supply with a negatively sloped aggregate demand curve, the price level will decrease, real GDP will increase, and the net effect on the balance of trade is ambiguous. In this case the price level elasticity of demand, by governing the relative strengths of the price level and real GDP changes, determines both the direction of change of the balance of trade and the size of the resultant trade deficit or surplus. In general, when aggregate demand is more elastic, the increase in real GDP is larger and the decrease in the price level is smaller such that a balance of trade deficit would be greater or a balance of trade surplus would be smaller than for a less elastic aggregate demand curve. Alternately, an elastic aggregate demand could result in a balance of trade deficit while an inelastic aggregate

demand could yield a balance of trade surplus. We illustrate this third possibility in Figure 2. When aggregate demand is inelastic, the relatively small increase of real income causes the trade deficit of Q_1A . The comparatively large decrease of the price level in contrast shifts the net export schedule upward to say $X_1^N(P_1)$ such that here the balance of trade ends in surplus equal to Q_1E_1' . On the other hand, if aggregate demand is elastic, the larger increase of real income creates the trade deficit Q_2B , while the smaller increase of the price level shifts the net exports schedule upwards by less, to only perhaps $X_2^N(P_2)$, again assuming that net exports exhibit the same elasticity with respect to the price level for the two aggregate demand curves. In this case, the balance of trade ends in deficit equal to Q_2E_2' .

III. Summary and Conclusion

This paper has examined the role of the price level elasticity of aggregate demand for the balance of trade when economic expansion occurs as the result of either an exogenous increase of aggregate demand or an exogenous increase of short-run aggregate supply. We reach two conclusions. First, when economic expansion occurs as the result of an increase of aggregate demand, the balance of trade deficit is larger the smaller the elasticity of aggregate demand with respect to the price level. Second, when economic expansion results from an increase of short-run aggregate supply, the price level elasticity of aggregate demand determines both the direction of change of the balance of trade and the size of the deficit or surplus. Beginning with a balance of payments of zero, we have shown that a relatively elastic aggregate demand curve will result in a balance of trade deficit while an inelastic aggregate demand function will cause a balance of trade surplus.

Notes

1. These conclusions are based on nominal values of exports, imports, and gross domestic product.
2. See for example Ferguson (2005) and McConnell et al, (2012:794,795).
3. We reviewed a total of sixteen macroeconomic textbooks, at both the principles and

intermediate levels, and in none of these did we find either explicit mention of the concept of the price level elasticity of aggregate demand or discussions of its importance. Three of those texts did, however, make reference to the slope of the aggregate demand curve and thereby hint to its elasticity. Colander (2013:572) for example implies that aggregate demand is quite inelastic with respect to the price level because "While all economists agree about the logic of the interest rate effect, the international effect, and the money wealth effect, most also agree that for small changes in the price level, the net effect is relatively small. So, even after the effect has been expanded by the multiplier, the AD curve has a very steep slope." Froyen (2013:51) states in a footnote that the aggregate demand curve in the Classical school is a rectangular hyperbola which, of course, has a unit elasticity with respect to the price level. Lastly, Gordon (2012:249,250) explains that when either the IS curve is vertical or the LM curve is horizontal the aggregate demand curve will become vertical with the inference that it is completely inelastic with respect to the price level.

4. The literature on the price level elasticity of aggregate demand is relatively small. Gambs (1974) showed that the Classical school implied that aggregate demand is unit elastic with respect to the price level. Keynes (1936) and his early disciples implied that aggregate demand was perfectly inelastic with a liquidity trap. Havrilesky (1975) and Purvis (1975) derived expressions for the price level elasticity of aggregate demand within the standard price-flexible IS-LM macroeconomic model. Kyer and Maggs (1992) derived an expression for aggregate demand elasticity which distinguished clearly between the Keynes and Pigou effects. Kyer and Maggs (1996) have also shown the relevance of aggregate demand elasticity for supply-side economics, for various monetary policy rules when aggregate supply shocks occur (Kyer and Maggs 1995), and for the federal government budget deficit (Kyer and Maggs 2013). Kyer and Maggs (2009) also demonstrated that the inclusion of inflation-indexed government bonds in real wealth will decrease the price level elasticity of aggregate demand.

5. For brevity, this paper considers only the case of economic expansion. The conclusions, however, are of course symmetric for decreases of real gross domestic product.

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