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ABSTRACT

Using a range of specifications that are standard in the relevant literature, this paper finds that China's rapid and sustained economic growth in the reform era has tended to be negatively correlated with its export growth and positively correlated with its import growth. This finding runs counter to widely-held perceptions on China's nexus of foreign trade and economic growth, and thus presents a serious challenge for interpretation. On the basis of some further regression analyses, and drawing on a number of applied studies on the subject matter, the paper argues that the finding is plausible and of complex ramifications. The conclusion which this paper arrives at, therefore, is that the Chinese experience has tended to be a case of strategic integration into the world market, rather than conforming to the standard neoclassical thesis of trade regime neutrality.

Key words: China, foreign trade, economic growth

Journal of Economic Literature Classification Numbers: F14, F43, O5332.

1. Introduction

Foreign trade expansion has been one of the most phenomenal developments of China's economy in the era of systemic reform and opening up to the world market which began in 1978. Starting from a trade-to-GDP ratio of 10% in 1978, by 2000, the ratio rose to 44%; and this was achieved against the background of the rapid growth of GDP, on average 9.5% per annum over this period (see Figure 1). The increased ratio, while significantly overstating the true situation because of exchange rate movements and the expansion of the share of material processing activities in total trade, is unmistakable in indicating the increased influences of foreign trade on China's economic development.

[Figure 1]

But whereas the increased integration of China's economy into the world market is indisputable, it is unclear as to the precise impact of such integration on economic growth. Theoretically, in development economics, there are indeed alternative, contrasting views on the relationship between trade and economic growth. Standard neoclassical theory highlights the contribution of trade to growth via improvement in allocative efficiency (Krueger [1984]). A refined version also highlights the benefits of trade expansion arising from greater capacity utilisation and economies of scale (Balassa [1978], [1985]). More recent 'new' theories of growth and trade emphasise the effect of trade through its impact on dynamic efficiency – it provides access to a wider market which raises the returns to R&D investment and/or fosters learning-by-doing activities, and to imported inputs which either embody new technology or are cheaper than what can be offered through domestic production (Lee [1995]; Romer [1994]). This last line of theoretical development is, to some extent, a formalisation of the analytical approach adopted by various 'dissident' economists (e.g., Amsden [1989]; Wade [1990]) in their studies of East Asian industrialisation.

In contrast, economists of neo-liberal orientation tend to narrowly, often exclusively, focus on the standard neoclassical view. This arises from the clear logical relationship between allocative efficiency and free trade, which rests upon the principle of (endowment-determined) comparative advantage. The thesis of trade regime neutrality which lies at the heart of the World Bank's (1987) forceful outward-looking policy explicitly rules out any form of strategic integration of late developing economies into the world market, which is precisely what the dissident economists consider as a prominent feature of the East Asian experience.[1]

These alternative views have been applied to the Chinese case. Lardy (1992, p.691), for instance, frames his question thus: 'has the expansion of foreign trade been achieved largely through a state-driven export strategy in which sales on the international market are viewed simply as a means of financing much needed imports? This would imply, as in the pre-reform era, that exports were selected without much consideration of China's comparative advantage and that, as a result, expanding exports might contribute little or nothing to economic growth.'[2] In contrast, Lo and Chan (1998) develop an alternative interpretation of China's experience with an emphasis on the detrimental effect of trade expansion that accords with its comparative advantage. Specifically, they argue that such expansion has resulted in an unfavourable pattern of international specialisation, although, just like the pre-reform era, it has contributed to growth via technology imports. This turns on the head of the mainstream view on the beneficial effects of export expansion.

The Chinese experience thus provides a case for testing the efficacy of the competing perspectives on the integration of developing countries into the world market. In particular, given China's position in the developing world, the experience is likely to be of widespread significance. This paper performs a range of regression analyses that involve various specifications concerning the relationship between exports and growth on the one hand, and between imports and growth on the other hand. On the basis of some qualifications that will be discussed in subsequent sections, the former is taken to represent the standard neo-liberal

thesis of trade regime neutrality, while the latter to represent the thesis of strategic integration into the world market.

The paper is organised in the following way. Section two reviews the literature on the relationship between trade and growth and develops various specifications for estimation. Section three presents the regression results, and makes some inferences from the results. Section four discusses the plausibility of the inferences in the context of the available studies on China's foreign trade and economic development. Section five offers some conclusions.

2. Conceptual Issues and Analytical Methods

There exists a vast literature on the relationship between foreign trade and economic growth. In particular, as recounted by Boltho (1996), the notion of export-led growth is underpinned by three major theories. These, namely, are: (a) the 'vent for surplus' models, where expansion in foreign demand raises domestic growth via its impact on resources utilisation; (b) the accelerator-type virtuous circles, where export expansion stimulates investment and raises productivity which, in turn, perpetuate the competitive advantage of the export sector; and (c) the supply-side focus, where export expansion increases the exposure of the economy to world market competition, thus improving its efficiency and spurring growth.

In the context of applying the notion of export-led growth to developing countries, it is the supply-side theory that has received most attention. This appears to be largely due to the long-lasting policy debate over export orientation and import substitution, which for decades has dominated decision-making in the developing world. In its recent manifestation, the debate has tended to focus on one specific point of difference – that is, whether different industries have different potentials in contributing to economic growth. In policy terms, should developing countries simply let the world market dictate their positions in the international division of labour, or should they attempt to prioritise the development of some particular industries?[3]

The thesis of trade regime neutrality clearly affirms the option of 'letting the market dictate', as its underlying theory is the principle of (endowment-determined) comparative advantage which focuses on allocative efficiency and assumes that any differentiated growth potentials between industries would be taken into account by the market. As for the thesis of strategic integration, the affirmation of the 'deliberate creation' option is based on two premises. First, it objects to the notion that there exists a 'normal path of development' for developing countries, and argues that the regulation of the world market could well result in underdevelopment instead of development. Second, however, the imperative of catching-up development implies that it is necessary for developing countries to integrate into the world market, in the form of importing technology. It is this second point, dubbed 'the learning paradigm' of late industrialisation by Amsden (1989), which links up the dissident thinking with one prominent aspect of the more formal 'new' theories of trade and growth.

In line with the above thinkings, there have also been different analytical approaches in applied studies. Hitherto, mainstream studies have tended to rely on econometric analysis, particularly focusing on the correlation between exports and economic growth. It is believed that a strong correlation of this kind would lean support to the theoretical hypothesis that outward-looking policies do lead to better growth performance than policies favouring import substitution. And the reason is that export growth, especially in the context of international comparison, reflects alternative uses of resources between exports and import-replacing domestic production (Balassa [1978], [1985]).

As for the dissident thesis of strategic integration, possibly because the perceived linkages between the prioritised industries and the rest of the economy (especially the export sector) are usually too subtle to be captured in econometric analysis, it is a salient feature that not much has been done on this front. This is not entirely satisfactory. It seems possible, to some extent, that the analytical methods that are often used in the mainstream studies could be utilised to support the dissident views as well.

A major objective of this paper is thus to explore along this line, by means of testing the Chinese case with the standard export-led growth hypothesis together with the modified analytical methods aimed at reflecting the dissident views. The justification for adopting this approach is as follows. First, if, for comparable model specifications, the correlation between exports and economic growth is found to be positive and significant whereas that between imports and growth is not, then one can infer that the Chinese experience does give support to the export-led growth hypothesis and hence the promises of an outward-looking policy. Second, if it is found that both exports and imports are positively correlated to growth, then there is at least the possibility that the contribution of foreign trade to growth takes effects via technology imports – rather than exclusively via the improvement in allocative efficiency. Finally, if it is found that only imports are positively correlated to growth, then the export-led growth hypothesis would break down and the experience can be inferred as conforming to the dissident thesis of strategic integration into the world market.

With the conceptual discussion above, it is thus possible to turn to the specification of econometric models for applied analysis. In the body of writings on export-led growth, the development has followed a progression that starts with bivariate regressions, moves on to a variety of production function-type formulations, and supplements with various econometric techniques for causality tests (Dutt and Ghosh [1996]). For the purpose of this paper, the following formulations are used for analysing China's experience of exports and economic growth:

$$\dot{Y} = \alpha + \beta_X \dot{X} + u \tag{1}$$

$$\dot{Y} = \alpha + \beta_X \dot{X} + \beta_L \dot{L} + \beta_K \dot{K} + u \tag{2}$$

$$(N/Y)\dot{N} = \alpha + \beta_X \hat{} \dot{X} + \beta_L \dot{L} + \beta_K \dot{K} + u \tag{3}$$

$$(N/Y)\dot{N} = \alpha + \beta_X * (X/Y)\dot{X} + \beta_L \dot{L} + \beta_K \dot{K} + u \tag{4}$$

where Y = GDP, X = export value, L = labour, K = capital, $N = Y - X$, and a dot over a variable denotes its annual growth rate in real terms. Appendix 1 of this paper gives the data sources and some further explanations, while Appendix 2 gives a formal statement of how the equations are derived and Appendix 3 performs unit-root and cointegration tests on the concerned data series.

The bivariate formulation of equation (1) implies that the relationship between export growth and economic growth can be associated with any of the three theories mentioned in the beginning of this section. Equation (2) is a standard neoclassical formulation which implies that export growth influences economic growth by means of raising the total factor productivity. For equation (3), where $\beta_X\wedge = \beta_X - X/Y$, the production function-type formulation is adjusted to exclude the effect arising from the national income accounting identity $Y \equiv C + I + G + X - M = N + X$, where, on the expenditure side, X is by definition a component of Y. Equation (4) is derived from a two-sector model, first developed by Feder (1986), where exports influence economic growth both through a productivity differential between the export and non-export sectors (δ) and the externality effect of the former on the latter (N_X). In this formulation, one has $\beta_X^* = [\delta/(1+\delta) + N_X - 1]$.

In a similar vein, for the relationship between import growth and economic growth, the following formulations can be used for estimation

$$\dot{Y} = \alpha + \beta_M \dot{M} + u \tag{5}$$

$$\dot{Y} = \alpha + \beta_M \dot{M} + \beta_L \dot{L} + \beta_K \dot{K} + u \tag{6}$$

$$(R/Y)\dot{R} = \alpha + \beta_M\wedge \dot{M} + \beta_L \dot{L} + \beta_K \dot{K} + u \tag{7}$$

$$(R/Y)\dot{R} = \alpha + \beta_M^*(M/Y)\dot{M} + \beta_L \dot{L} + \beta_K \dot{K} + u \tag{8}$$

where M = import value, $R = Y + M$, $\beta_M\wedge = \beta_M + M/Y$, and $\beta_M^* = [\delta/(1+\delta) + R_M - 1]$.

In this connection, it might be helpful also to estimate equations (2) through (4) and (6) through (8) in their intensive forms – that is, assuming that there are constant returns to scale in labour and capital (i.e., $\beta_L + \beta_K = 1$). Thus, one has, for exports and growth,

$$(\dot{Y} - \dot{L}) = \alpha + \beta_X \dot{X} + \beta_K(\dot{K} - \dot{L}) + u \tag{2a}$$

$$[(N/Y)\dot{N} - \dot{L}] = \alpha + \beta_X \hat{} \dot{X} + \beta_K(\dot{K} - \dot{L}) + u \tag{3a}$$

$$[(N/Y)\dot{N} - \dot{L}] = \alpha + \beta_X * (X/Y)\dot{X} + \beta_K(\dot{K} - \dot{L}) + u \tag{4a}$$

and, for imports and growth,

$$(\dot{Y} - \dot{L}) = \alpha + \beta_M \dot{M} + \beta_K(\dot{K} - \dot{L}) + u \tag{6a}$$

$$[(R/Y)\dot{R} - \dot{L}] = \alpha + \beta_M \hat{} \dot{M} + \beta_K(\dot{K} - \dot{L}) + u \tag{7a}$$

$$[(R/Y)\dot{R} - \dot{L}] = \alpha + \beta_M * (M/Y)\dot{M} + \beta_K(\dot{K} - \dot{L}) + u \tag{8a}$$

There are both reasons for and against the intensive-form formulation. As Salvatore and Hatcher (1990) point out, the justification for focusing on the growth of the output-labour ratio is that development is more closely associated with increases in real per capita incomes than with increases in income over time, and that there are typically large unemployment and even larger underdevelopment in most developing countries. More specifically, the different theories indicated in the beginning of this section imply that foreign trade can impact on growth by raising total factor productivity and/or by increasing resources utilisation. In the context of the discussion here on the Chinese experience, it is also likely that the thesis of strategic integration – with its emphasis on technology imports – would be comparatively more inclined to argue for the intensive-form formulation. Thus, on the whole, whilst the formulation in equations (2) through (4) and (6) through (8) would tend to underestimate the impact of trade on growth, that of the intensive-form formulation might overestimate it. For

avoiding *a priori* judgements, in the regression analyses below, both of the two types of formulation are used.

Finally, purely for practical purpose, in the regression that involves data of the pre-1979 period, a number of dummy variables have to be used. The first dummy, D_{glf}, is intended to filter out the disruption caused by the major political event in 1958-60, the Great Leap Forward. Thus, D_{glf} is set to 1 for the years 1959, 1960 and 1961, and 0 for other years. Two further sets of dummies are used to test possible structural changes amid the transition from the pre-reform era to the reform era. The intercept dummy, D_{int}, is set to 0 for the years 1953-78 and 1 for the years 1979-2000. As for the slope dummies, D_X, D_M, D_{XX}, and D_{MM}, they are set to 0 for the years 1953-78, and the values of $\dot{X}$, $\dot{M}$, $(X/Y)\dot{X}$, and $(M/Y)\dot{M}$, respectively, for the years 1979-2000.

3. The Estimation Results and Interpretation

A number of observations concerning China's nexus of foreign trade and economic growth, during the reform era of 1979-2000 as well as the pre-reform era, can be made from the regression results presented in Table 1 through Table 4.

Observation 1: insignificant or negative correlations between exports and economic growth in 1979-2000. Consider Table 1. It is noted from the regression results of equations (1) to (2a) that the correlation between export growth and either economic growth or total factor productivity change is statistically insignificant. It is further noted from the regression results of equations (3) and (3a) that, once modification is made to exclude the effect of the national income accounting identity $Y \equiv C + I + G + X - M$, the correlation between export growth and economic growth (via total factor productivity change) becomes statistically significant but is negative. Finally, the regression results of equations (4) and (4a) indicate that, once the productivity differential between the export sector and the non-export sector, as well as the externality effect of the former on the latter, are taken into account, the correlation

between export growth and economic growth becomes strongly negative. Throughout, the value of the adjusted coefficient of determination ($\overline{R}^2$) increases basically along with the progressive modifications of the regression equations from (1) to (4).

[Table 1]

Observation 2: significant and positive correlations between imports and economic growth in 1979-2000. Consider Table 2. It is noted from the regression results of equations (5) to (6a) that the correlation between import growth and both economic growth and total factor productivity change is statistically significant and positive, although rather modest in magnitudes. It is further noted from the regression results of equations (7) and (7a) that, once the effect of the national income accounting identity is excluded, the correlation becomes much more strongly positive. Finally, the regression results of equations (8) and (8a) indicate that, once the productivity differential and the externality effect are taken into account, the correlation between import growth and economic growth becomes even more strongly positive. Throughout, the value of $\overline{R}^2$ increases along with the progressive modifications of the regression equations from (5) to (8).

[Table 2]

Taken together, the two observations suggest that, at least in terms of its supply-side effect, the impact of export growth on economic growth is either insignificant or significant but negative, depending on the precise forms of the impact in focus – whereas the impact of import growth is persistently both significant and positive. The positive contribution of foreign trade to China's sustained and rapid economic growth during the reform era of 1979-2000, if any, thus appears to effect via imports rather than exports. To seek support for the above observations and interpretation, it will be useful to apply the regression analyses to the extended period of 1953-2000. This will make use of much longer series of statistical data. By means of using relevant dummy variables, it will also help to detect the existence or otherwise

of structural breaks between the pre-reform era and the reform era. Again, two important observations are of note.

Observation 3: significant and positive correlations between exports and economic growth in 1953-2000. Consider Table 3. It is noted from the regression results of equations (1) to (2a) that the correlation between export growth and both economic growth and total factor productivity change is statistically significant and positive. For all these three equations, the estimated value of the coefficient of export growth stands at around 0.3, which is a rather substantial level. The adjustment made to exclude the effect of the national income accounting identity does not significantly change the estimated value of the coefficient, as can be seen from the regression results of equations (3) and (3a). Furthermore, the regression results of equations (4) and (4a) indicate that, once the productivity differential and the externality effect are taken into account, the correlation between export growth and economic growth becomes even more strongly positive – very strong indeed, with the estimated value of the coefficient of export growth increasing to 5.724 in equation (4) and to 5.671 in equation (4a). Finally, the value of $\overline{R}^2$ does increase along with the progressive modifications of the regression equations from (1) to (4), but the magnitudes of increase are rather modest.

[Table 3]

Observation 4: significant and positive correlations between imports and economic growth in 1953-2000. Consider Table 4. It is noted from the regression results of equations (5) to (6a) that the correlation between import growth and both economic growth and total factor productivity change is statistically significant and positive. The adjustment made to exclude the effect of the national income accounting identity does not significantly change the estimated value of the coefficient of import growth, as is shown by the regression results of equations (7) and (7a). Yet, the regression results of equations (8) and (8a) indicate that, by including the productivity differential and the externality effect, the correlation between import growth and economic growth becomes very strongly positive – though not as strong as

in the case of the correlation between export growth and economic growth. Finally, the value of $\overline{R}^2$ increases basically along with the progressive modifications of the regression equations from (5) to (8), but the magnitudes of increase are, again, rather modest.

[Table 4]

With regard to the transition from the pre-reform era to the reform era, there is a sharp contrast between the exports-growth relationship on the one hand, and the imports-growth relationship on the other hand. Comparing *observation 1* and *observation 3*, it is clear that the correlations between export growth and economic growth turn from persistently positive to persistently negative. The estimated coefficients of the slope dummies in Table 3, which are all statistically significant and negative, confirm that there are indeed structural breaks with the exports-growth relationship from the period 1953-78 to the period 1979-2000. In contrast, the correlations between import growth and economic growth have been significantly positive throughout, with *observation 2* and *observation 4* agreeing with each other. The estimated coefficients of the slope dummies in Table 4, which are all statistically insignificant, confirm that there are no structural breaks with the imports-growth relationship. Thus, a fifth observation can be made.

Observation 5: a breakdown of the structural relationship between export growth and economic growth, but not between import growth and economic growth, amid the transition from the pre-reform era to the reform era. Specifically, the exports-growth relationship turns from positive to negative, whereas the imports-growth relationship remains positive throughout.

In this connection, it is of interest to note two further points concerning the possible explanation of the imports-growth relationship, which might also provide clues for explaining the structural breaks with the exports-growth relationship.

First, consider the regression results from equations that involve the intensive-form production function, i.e., equations (6a), (7a) and (8a) for imports and growth. For the period

1979-2000, the regression results indicate that the intensive-form specification, while raising the value of $\overline{R}^2$, reduces the estimated values of the coefficient of import growth – implying that there is some degree of substitution between the effects of imports and the capital-labour ratio on growth. Noting that, in the theoretical literature, there has been an influential tradition (e.g., in the work of Nicholas Kaldor) of interpreting the intensive-form production function as the technical progress function of the economy, and the change of the capital-labour ratio as representing embodied technological change, it might be inferred that to a significant extent the impact of import growth on economic growth in China takes the form of technology imports. But it is also noted that, in the pre-reform era, there does not appear to have a substitution between the effects of imports and the capital-labour ratio on growth. A plausible explanation is that, although technology imports have been important throughout, it is only after almost three decades of industrialisation that, by the reform era, the accumulated domestic technological capability becomes – to some extent – a substitute for technology imports.

Second, consider the regression results from equations (8) and (8a), where both the productivity differential and externality effects which imports impact on growth are taken into account. There is a massive increase in the values of the estimated coefficients of imports both in the reform and pre-reform eras, over and above the corresponding estimated values for equations (7) and (7a). In the original formulation of the two-sector models concerning the exports-growth relationship, from which equations (4) and (4a) are derived, the underlying theory is that the externality effect would materialise through a process of resources reallocation from the non-export sector to the presumably more efficient export sector (see Feder [1986], and Greenaway and Sapsford [1994]). In the context of the discussion on the relationship between imports and growth, however, because imports are not in direct competition with the rest of the economy for domestic resources, a more plausible reason for the finding from equations (8) and (8a) of a strong externality effect thus, again, appears to be technology imports.

Overall, it might be inferred that the impact of foreign trade on China's economic growth has effected mainly via imports. The positive effect of exports on growth pre-1979 is at least partly ascribable to the fact that they served as a means of payment for imports. But, such effect seems to have largely diminished in the reform era because of the availability of alternative sources of imports financing, that is, capital inflows.

4. Discussing the Results: Plausibility and Implications

Are the regression results reported in the preceding section plausible? In view of the relevant literature, it seems fair to say that not much can be drawn upon for approving or disapproving the findings of this paper. Existing studies on the topic are mostly econometric analyses, which themselves await backing from less formal yet more subtle – and arguably more ascertaining – narrative or descriptive analyses. Nevertheless, it is certain that this paper does not stand alone; it rather can find considerable agreement with its findings from the literature. In particular, the detailed analyses of China's nexus of foreign trade and economic growth, and the review on the available studies, in Lo and Chan (1998) provide direct support for this paper. The discussion below thus draws mainly on that earlier research.

Consider the central finding of this paper: that the correlation between China's exports and economic growth in the market reform era of 1979-2000 is insignificant or even negative. Unsurprisingly, this runs counter to widely-held perceptions. In its 1996 *World Development Report*, the World Bank, for instance, strongly recommends that China's export-led growth strategy be adopted by other 'transitional economies'. But, the finding actually is consistent with a number of empirical studies including Hsueh and Woo (1996), as well as Lo and Chan (1998). Both studies point to the secular deterioration of China's terms of trade in the reform era as evidence of the unfavourable impact which foreign trade makes on growth. Hsueh and Woo (1996) argue that this unfavourable trend has been caused by a steady decline of the factor productivity (in real terms) of commodity exports. Meanwhile, Lo and Chan

(1998) report that, mostly in the first half of the reform era, there was a phenomenon of asymmetric development between the commodity composition of exports and the structure of industrial production – sectors with fast export expansion (mostly labour-intensive industries that do appear to accord with China's 'given' comparative advantage) tended to account for falling shares of total industrial output. This contrasts with the standard neoclassical theory of efficiency gains from trade, where it is posited that resources would flow to the presumably more efficient export sector thereby generating economic growth.[4]

Turning to the correlations between imports and economic growth, there is almost a consensus in the literature that technology imports have played a prominent role both pre-reform and in the reform era – although econometric work by Yu (1998) and the like, using Granger-causality tests, has failed to detect any causal relation between imports and growth. Zhao (1995) is one of the few studies that analyse directly the precise channels through which technology imports contribute to China's economic growth. His main finding is that, throughout the period 1960-91, technology imports (proxied by the value of imported heavy industrial goods) were significantly and positively correlated with, first, domestic research and development expenditure, second, investment for technical renovation and upgrading, third, output value of China's heavy industry, and, fourth, export of heavy industrial goods. The conclusion thus is that technology imports effect economic growth by enhancing the domestic technological capability. More broadly, Lo and Chan (1998) posit that technology imports, in conjunction with the existence of mass consumption underpinned by China's egalitarian pattern of income distribution, lead to the explosive expansion of a very wide range of mass production and rapid productivity-growing industries. The resulting structural change in Chinese industry, characterised by the massively expanding shares of these mass production industries which do not appear to accord with China's international comparative advantage, is posited to be the impetus behind the overall economic growth.

If the judgements made in the preceding paragraphs are valid, China's experience of integration into the world market would give rise to important implications for the long-

lasting development policy debate. It is unmistakable that the influence of the integration on China's economic development has increased massively in the reform era. But, the finding that export expansion has been in fact insignificantly or even negatively correlated with economic growth puts the validity of the orthodox outward-looking policy in question. More broadly, it gives support to the sceptical view over the notion of a normal path of development, which is said to be open to all developing countries should they follow the principle of trade regime neutrality – that is, should they specialise in line with their 'given' international comparative advantage. Meanwhile, turning on the head of the standard neoclassical theory of export-led growth, the findings of the paper suggest that it is the import side, in the form of technology imports, that has made positive contribution to China's economic growth. And it is this peculiar feature, with export expansion being mainly driven by the need of imports, that marks the continuity of China's nexus of foreign trade and economic growth in the reform era with that of the pre-reform era. The Chinese experience, on the whole, thus appears to support the rival thesis of strategic integration into the world market – that is, rather than leaving its position in the international division of labour to be dictated by the world market, China has attempted to shape the position by focusing on technological development.

Before coming to a close of the discussion, it might be necessary to point out that the conclusion above, which concerns the validity of the two rival theses about trade and development, does not necessarily amount to a complete assessment of China's nexus of foreign trade and economic growth. Recall that, as indicated in Section 2, there exist different theories about the notion of export-led growth of which the neoclassical emphasis on trade regime neutrality and allocative efficiency is just one. In the analyses of this paper, apart from the reduced-form regression that involves equations (1) and (5), the focus has been on the supply-side effects of exports and imports on economic growth. But, a complete assessment of China's nexus of foreign trade and economic growth requires taking into account the demand-side effects as well. In other words, it is necessary also to investigate the influence of

exports on other components of aggregate demand. The influence is likely to be positive and significant in the second half of the reform era, with the progressive transition of the Chinese economy from a resource-constrained one to a demand-constrained one. Finally, the observable fact that, also in the second half of the reform era, the fast export expanding sectors (mostly the mass production industries indicated above) are also those with output shares in Chinese industry as a whole rapidly expanding, should reinforce the above point.

5. Conclusions

Using a range of specifications that are standard in the relevant literature, this paper finds that China's rapid and sustained economic growth in the reform era has tended to be negatively correlated with its export growth and positively correlated with its import growth.

On the basis of some further regression analyses, and drawing on a number of applied studies on the subject matter, the paper argues that the finding is plausible. It is further argued that the Chinese experience has tended to be a case of strategic integration into the world market, rather than conforming to the orthodox thesis of trade regime neutrality. That is to say, rather than leaving its position in the international division of labour to be dictated by the world market, China has attempted to shape the position by focusing on technological development – with the rapid expansion of imports and exports being used as a means to achieve this end.

Notes

1. Pack and Westphal (1986, p.88) gives a standard definition of trade regime neutrality: 'that policies should not selectively discriminate – that is, for tradeables, vis-à-vis world prices, and for non-tradeables, vis-à-vis relative scarcities – among industries.' As for strategic integration into the world market, it refers precisely to a situation where the trade regime involves selective discrimination: providing variable effective rates of protection, and export incentives, for different categories of goods. Thus, the division between the two is essentially about the international specialisation of an economy: should it strictly follow its comparative advantage, or should it attempt to create competitive advantage over specific industries.
2. Lardy's query concerning the increased influence of the logic of (endowment-determined) comparative advantage on China's economic development in the reform era is broadly confirmed by relevant studies in the literature. In a comprehensive analysis of the commodity composition of China's exports, the World Bank (1994), for instance, confirms that the export expansion has been largely accounted for by labour-intensive, light industrial products (see also Lardy [1994]). Looking at the more general aspect of the movements of China's effective exchange rate (EER), Sung (1995, p.140), concludes that 'the jump in imports and the relaxation of foreign exchange controls point to a decrease in the scarcity price of imports. This, together with the large rise in the export EER, implies a significant reduction in the bias of trade.' That is to say, China's trade regime has been, on average, heading towards neutrality. Nevertheless, a qualification has been raised by more recent writings like Lo and Chan (1998) and Yoshitomi (1996) who find that, since the mid-1980s, China has rapidly expanded the exports of a wide range of capital-intensive products which do not appear to accord with its 'given' comparative advantage.

3. For a major manifestation of this debate, see the World Bank's *The East Asian Miracle: Economic Growth and Public Policy* (Washington, D.C.: The World Bank, 1993) and the related exchanges in the special issue of *World Development*, 1994, vol.22, no.4. Note the division over the existence or otherwise of differentiated growth potentials among industries, and of a normal path of development, is particularly sharp in these writings.
4. In this connection, it is worth-noting that China's industrial production and exports have both been very unevenly distributed in spatial terms, and there are some studies which find significant correlations between the patterns of spatial distribution of the two type of activities. These findings are then claimed to be giving support to the hypothesis of export-led growth (see, e.g., Wei [1995]). But, because regional economic growth can be generated by economic rents (or income transfers) as well as efficiency improvement, such claim as it stands is at best dubious. In particular, Hsueh and Woo (1996) point out that, because the depreciation rate of RMB during the period 1979-91 was much higher than the domestic inflation rate (244% relative to 110%), the export biased areas and sectors – the coastal provinces and consumer goods industries – were bound to enjoy relatively more rapid growth of real incomes.

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Appendix 1. Data

Table A.1 gives the data used in the analysis of this paper. The main data source is *China Statistical Yearbook* (*Zhongguo Tongji Nianjian*, various years), which is published by China's State Statistical Bureau. The following points explain the transformation of the data, as well as some additional data sources.

1. *GDP*. Both the current-price GDP data and the real annual growth rates are official.

2. *Exports and Imports*. China records its foreign trade in terms of U.S. dollars, and converts them into the local currency (RMB yuan) at the official exchange rate. To calculate the real growth rates of the value of exports and imports, the domestic retail price index (RPI) is used as deflator in this paper.

3. *Labour*. Chinese statistical authorities publish annual data of year-end total labour employment. To make it more consistent with the production function framework, mid-year data, calculated as arithmetic means of consecutive year-end data, are used instead.

4. *Capital*. China's State Statistical Bureau has not published its estimates of the value of the country's capital stock. In this paper, the capital stock figures (100 million yuan at 1990 constant prices) for the years 1952-1997 are from Shen (1999), which are perhaps the most sophisticated estimates in the literature. Data for the subsequent years are calculated by using the official data of nominal values of annual fixed-asset investment and investment price index.

Appendix 2. Model Specifications

1. The augmented production function

Starting from the simple Cobb-Douglas production function in log-linear form

$$\dot{Y} = \dot{A} + \beta_L \dot{L} + \beta_K \dot{K} \qquad \text{(A.1.1)}$$

which is augmented by incorporating either of two alternative postulates regarding the nexus of foreign trade and economic growth: namely, (a) the neoclassical postulate which emphasises

$$\dot{A} = \alpha + \beta_X \dot{X} \qquad \text{(A.1.2)}$$

versus (b) the structuralist postulate which emphasises

$$\dot{A} = \alpha + \beta_M \dot{M} \qquad \text{(A.1.3)}$$

Substituting (A.1.2) and (A.1.3) into (A.1.1) yields the two alternative formulations of (A.1.4) and (A.1.5), respectively, below

$$\dot{Y} = \alpha + \beta_X \dot{X} + \beta_L \dot{L} + \beta_K \dot{K} \qquad \text{(A.1.4)}$$

$$\dot{Y} = \alpha + \beta_M \dot{M} + \beta_L \dot{L} + \beta_K \dot{K} \qquad \text{(A.1.5)}$$

These are equations (2) and (6) in the text which I use for estimation.

2. Adjusting to exclude the national income accounting identity effects

The regressions using $\dot{Y}$ as the dependent variable could be spurious due to the relationship between GDP, exports and imports as defined by the national income accounting identity

$$Y \equiv C + I + G + X - M$$

This, in turns, yields the following two formulations

$$Y = X + N$$

$$Y = R - M$$

where $N = C + I + G - M$ and $R = C + I + G + X$. In the former case, the growth rate of Y is thus approximately given by

$$\dot{Y} = \left(\frac{X}{Y}\right)\dot{X} + \left(\frac{N}{Y}\right)\dot{N}$$

Substituting the above into (A.1.4) yields

$$\left(\frac{N}{Y}\right)\dot{N} = \alpha + (\beta_X - \frac{X}{Y})\dot{X} + \beta_L\dot{L} + \beta_K\dot{K} \qquad \text{(A.1.6)}$$

Similarly, regarding the relationship between import growth and economic growth, one has

$$\left(\frac{R}{Y}\right)\dot{R} = \alpha + (\beta_M + \frac{M}{Y})\dot{M} + \beta_L\dot{L} + \beta_K\dot{K} \qquad \text{(A.1.7)}$$

(A.1.6) and (A.1.7) are regression equations (3) and (7), respectively, in the main text.

3. The two-sector models

The following two-sector model, which has been applied to the analysis of the relationship between export growth and economic growth, was first developed by Feder (1986) and has been modified by various economists. In this Appendix, I follow Greenaway and Sapsford (1994), and try to apply it to analyse the relationship between import growth and economic growth as well. To begin with, the economy is divided into the export and non-export sectors, X and N, with the former generating positive externality effects on the latter.

$$X = X\,(L_X\,,\,K_X) \qquad \text{(A.1.8)}$$

$$N = N\,(L_N\,,\,K_N\,,\,X) \qquad \text{(A.1.9)}$$

Assuming that there is a differential in marginal productivity between the export sector and the non-export sector, with a magnitude of δ, it then follows (A.1.10) below, together with the resources constraint (A.1.11)

$$X_L = (1+\delta)N_L \quad , \quad X_K = (1+\delta)N_K \qquad \text{(A.1.10)}$$

$$L = L_X + L_N \quad , \quad K = K_X + K_N \qquad \text{(A.1.11)}$$

Totally differentiating (A.1.8) and (A.1.9) yields

$$\Delta X = X_L \Delta L_X + X_K \Delta K_X \qquad \text{(A.1.12)}$$

$$\Delta N = N_L \Delta L_N + N_K \Delta K_N + N_X \Delta X \qquad \text{(A.1.13)}$$

Dividing (A.1.13) by Y and substituting in (A.1.10), (A.1.11) and (A.1.12) yields,

$$\left(\frac{N}{Y}\right)\dot{N} = \left(\frac{N_L L}{Y}\right)\dot{L} + \left(\frac{N_K K}{Y}\right)\dot{K} + \left(N_X + \frac{\delta}{(1+\delta)} - 1\right)\left(\frac{X}{Y}\right)\dot{X}$$

Following the customary assumption that the marginal productivity of inputs in a given sector might be related to the average output-labour and output-capital ratios in the economy (see Feder 1986), that is

$$N_L = \beta_L\left(\frac{Y}{L}\right) \quad , \quad N_K = \beta_K\left(\frac{Y}{K}\right)$$

one can finally arrive at the following formulation for estimation

$$\left(\frac{N}{Y}\right)\dot{N} = \left(N_X + \frac{\delta}{(1+\delta)} - 1\right)\left(\frac{X}{Y}\right)\dot{X} + \beta_L\dot{L} + \beta_K\dot{K} \qquad \text{(A.1.14)}$$

Similarly, with the qualification that the L_M and K_M in $M = M\,(L_M\,,\,K_M)$ should be viewed as the equivalence of domestic resources cost rather than the actual resources devoted to the production of imports, one arrives at

$$\left(\frac{R}{Y}\right)\dot{R} = \left(R_M + \frac{\delta}{(1+\delta)} - 1\right)\left(\frac{M}{Y}\right)\dot{M} + \beta_L\dot{L} + \beta_K\dot{K} \qquad \text{(A.1.15)}$$

(A.1.14) and (A.1.15) are regression equations (4) and (8), respectively, in the main text.

Appendix 3. Unit-root and Cointegration Tests of Data Series

Time series data are known to be vulnerable to the problem of nonstationarity which might result in spurious regression. Hence, it is a common practice in applied econometric analysis to perform unit root tests and, if nonstationarity is found to be present, to further test the existence or otherwise of cointegration between the data series. In this appendix, I follow the standard procedure of testing the (non)stationarity of the data series by means of the augmented Dickey-Fuller (ADF) test which takes the following form

$$\Delta Z_t = \phi + \gamma Z_{t-1} + \delta \Delta Z_{t-1} + u_t \qquad \text{(A.3.1)}$$

In this formulation, the null hypothesis to be tested is $\gamma = 0$ which implies that X_t is integrated of order one, or *I(1)*; and the alternative hypothesis is $\gamma < 0$ which implies that X_t is *I(0)*. Readers are referred to D.N. Gujarati (1995, ch.21) (*Basic Econometrics*, 3rd edition, New York, McGraw-Hill, Inc.) for a detailed discussion of the test.

Equation (A.3.1) is applied to the principal data series used in this paper, i.e., the real growth rates of GDP, exports and imports. The results, presented in Table A.2, indicate that the null hypothesis that a unit root exists for any of the three series is rejected at 1% level of confidence. The data series are thus regarded as free of the problem of nonstationarity. This is sufficient for the purpose of this paper, which focuses on the correlations between the rates of growth of the variables and where the concern is whether the regressions are spurious.

Nevertheless, it is worth-noting that, in the case of the levels (rather than growth rates) of the data series, the ADF statistics fail to reject the null hypothesis. The property of the levels of the data series being *I(1)* is confirmed by the fact that, for the first differences of the variables, the ADF statistics once again reject the null hypothesis at 1% level of confidence. It is thus necessary to further test the cointegration between the data series. I use the Engle-Granger two-step test which follows the procedure of first using equation (A.3.2) and its reverse regression (A.3.3) below

$$Z_t = \alpha_1 + \beta_1 Z_t^* + u_t \qquad \text{(A.3.2)}$$

$$Z_t^* = \alpha_2 + \beta_2 Z_t \ + u_t^* \qquad \text{(A.3.3)}$$

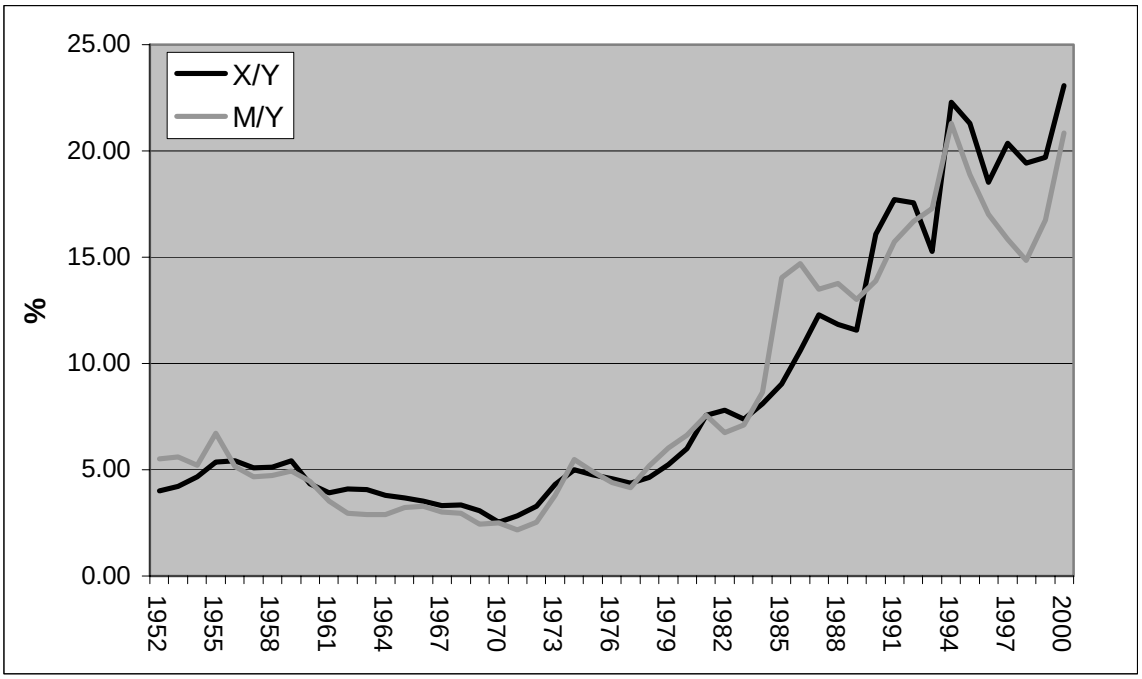
If Z_t and Z_t^* are cointegrated, then the residuals from (A.3.2) and (A.3.3), i.e. u_t and u_t^*, must be *I(0)*. To check this property, I apply the ADF test on the residuals obtained from applying (A.3.2) and (A.3.3) on growth and exports, and growth and imports. The test takes the form

$$\Delta u_t \ = \phi_1 + \gamma_1 u_{t-1} \ + \delta_1 \Delta u_{t-1} \ + v_t \qquad \text{(A.3.4)}$$

$$\Delta u_t^* = \phi_2 + \gamma_2 u_{t-1}^* + \delta_2 \Delta u_{t-1}^* + v_t^* \qquad \text{(A.3.5)}$$

As can be seen from Table A.2, the regression results do support the view that the growth and exports series, as well as the growth and imports series, are both cointegrated, but only at 5% or 10% level of significance. These results are not entirely satisfactory, and further transformation of the data and/or modification of the unit-root and cointegration test models seem necessary – particularly for detecting the causality structure (if any) among the time series, which can be explored in future research.

Figure 1. China's Trade-GDP Ratios, 1953-2000



Notes: Y = nominal GDP, X = nominal export value, M = nominal import value, all in RMB 100 million yuan. X and M figures are converted from US dollar data at current exchange rates.

Sources: Same as Data Appendix 1.

Table 1. Regression Results for the Period 1979-2000: Exports and Growth

	(1) $\dot{Y}$	(2) $\dot{Y}$	(2a) $[\dot{Y} - \dot{L}]$	(3) $(N/Y)\dot{N}$	(3a) $[(N/Y)\dot{N} - \dot{L}]$	(4) $(N/Y)\dot{N}$	(4a) $[(N/Y)\dot{N} - \dot{L}]$
Constant	-0.153 (-0.221)	-0.228 (-0.339)	-0.242 (-0.368)	-0.404 (-0.566)	-0.411 (-0.591)	-0.238 (-0.354)	-0.252 (-0.382)
$\dot{X}$	-0.004 (-0.153)	0.010 (0.357)	0.008 (0.283)	-0.181 (-6.016)*	-0.183 (-6.308)*		
$(X/Y)\dot{X}$						-0.942 (-13.540)*	-0.951 (-14.016)*
$\dot{L}$		-0.310 (-0.791)		-0.134 (-0.323)		-0.304 (-0.800)	
$\dot{K}$		0.866 (1.211)		0.918 (1.210)		0.869 (1.216)	
$[\dot{K} - \dot{L}]$			1.181 (4.242)*		1.071 (3.646)*		1.181 (4.347)*
$\overline{R}^2$	-0.049	0.007	0.460	0.690	0.791	0.725	0.813
DW	1.718	1.951	1.945	1.990	1.993	1.947	1.940

Notes: Figures in parentheses are t-ratios; * and ^ are significant at 5% and 10% confidence levels, respectively. The number of observations is 22 for all the regressions. The first differences of the variables are used for all the regressions, because using the original variables results in low DW values, which ranage from 0.829 to 1.008. Note that the null hypothesis for the coefficient of $(X/Y)\dot{X}$ is Ho = -1 in equations (4) and (4a).

Table 2. Regression Results for the Period 1979-2000: Imports and Growth

	(5) $\dot{Y}$	(6) $\dot{Y}$	(6a) $[\dot{Y} - \dot{L}]$	(7) $(R/Y)\dot{R}$	(7a) $[(R/Y)\dot{R} - \dot{L}]$	(8) $(R/Y)\dot{R}$	(8a) $[(R/Y)\dot{R} - \dot{L}]$
Constant	-0.150 (-0.232)	-0.193 (-0.306)	-0.233 (-0.368)	0.082 (0.127)	0.444 (0.069)	-0.264 (-0.410)	-0.278 (-0.433)
$\dot{M}$	0.043 (1.636)^	0.046 (1.616)^	0.032 (1.241)	0.197 (6.733)*	0.184 (7.008)*		
$(M/Y)\dot{M}$						1.239 (12.230)*	1.162 (13.145)*
$\dot{L}$		-0.461 (-1.275)		-0.459 (-1.236)		-0.417 (-1.134)	
$\dot{K}$		0.394 (0.538)		0.474 (0.630)		0.478 (0.639)	
$[\dot{K} - \dot{L}]$			1.166 (4.674)*		1.865 (4.662)*		1.159 (4.585)*
$\overline{R}^2$	0.074	0.126	0.499	0.726	0.758	0.728	0.761
DW	1.835	2.151	2.062	2.342	2.264	2.055	2.005

Notes: Figures in parentheses are t-ratios; * and ^ are significant at 5% and 10% confidence levels, respectively. The number of observations is 22 for all the regressions. The first differences of the variables are used for all the regressions, because using the original variables results in low DW values, which ranage from 1.064 to 1.294. Note that the null hypothesis for the coefficient of $(M/Y)\dot{M}$ is Ho = -1 in equations (8) and (8a).

Table 3. Regression Results for the Period 1953-2000: Exports and Growth

	(1) $\dot{Y}$	(2) $\dot{Y}$	(2a) $[\dot{Y} - \dot{L}]$	(3) $(N/Y)\dot{N}$	(3a) $[(N/Y)\dot{N} - \dot{L}]$	(4) $(N/Y)\dot{N}$	(4a) $[(N/Y)\dot{N} - \dot{L}]$
constant	1.237 (0.784)	0.989 (0.634)	0.987 (0.648)	0.960 (0.613)	0.980 (0.640)	0.997 (0.634)	0.983 (0.636)
$\dot{X}$	0.331 (3.405)*	0.302 (3.019)*	0.302 (3.209)*	0.256 (2.547)*	0.259 (2.739)*		
$(X/Y)\dot{X}$						5.724 (2.874)*	5.671 (3.062)*
$\dot{L}$		-0.113 (-0.168)		-0.020 (-0.030)		-0.168 (-0.251)	
$\dot{K}$		1.104 (1.955)*		1.100 (1.937)*		1.107 (1.940)*	
$[\dot{K} - \dot{L}]$			1.108 (2.694)*		1.066 (2.579)*		1.133 (2.754)*
D_{glf}	-11.054 (-2.223)*	-7.822 (-1.428)^	-7.800 (-1.621)^	-7.576 (-1.376)^	-7.796 (-1.611)^	-8.117 (-1.474)^	-7.952 (-1.633)^
D_{int}	-1.390 (-0.626)	-1.222 (-0.560)^	-1.220 (-0.569)	-1.370 (-0.624)	-1.390 (-0.645)	-1.243 (-0.564)	-1.227 (-0.567)
D_X	-0.335 (-2.926)*	-0.297 (-2.640)*	-0.296 (-2.663)*	-0.440 (-3.844)*	-0.442 (-3.946)*		
D_{XX}						-6.678 (-2.856)*	-6.630 (-3.017)*
$\bar{R}^2$	0.343	0.371	0.345	0.413	0.420	0.409	0.416
DW	2.181	2.183	2.183	2.198	2.193	2.146	2.151

Notes: Figures in parentheses are t-ratios; * and ^ are significant at 5% and 10% confidence levels, respectively. The number of observations is 47 for all the regressions. The first differences of the variables are used for all the regressions, because using the original variables results in low DW values, which range from 1.406 to 1.465. Note that the null hypothesis for the coefficient of $(X/Y)\dot{X}$ is Ho = -1 in equations (4) and (4a).

Table 4. Regression Results for the Period 1953-2000: Imports and Growth

	(5) $\dot{Y}$	(6) $\dot{Y}$	(6a) $[\dot{Y} - \dot{L}]$	(7) $(R/Y)\dot{R}$	(7a) $[(R/Y)\dot{R} - \dot{L}]$	(8) $(R/Y)\dot{R}$	(8a) $[(R/Y)\dot{R} - \dot{L}]$
constant	1.438 (0.870)	1.120 (0.680)	1.208 (0.750)	1.111 (0.682)	1.187 (0.746)	1.272 (0.750)	1.445 (0.870)
$\dot{M}$	0.149 (2.514)*	0.121 (1.996)*	0.126 (2.156)*	0.168 (2.807)*	0.172 (2.989)*		
$(M/Y)\dot{M}$						2.476 (2.774)*	2.603 (2.937)*
$\dot{L}$		0.223 (0.338)		0.218 (0.335)		0.280 (0.412)	
$\dot{K}$		1.103 (1.812)*		1.065 (1.770)*		1.306 (2.127)*	
$[\dot{K} - \dot{L}]$			0.952 (2.241)*		0.934 (2.225)*		1.040 (2.385)*
D_{glf}	-14.338 (-2.884)*	-10.126 (-1.777)*	-11.147 (-2.302)*	-10.092 (-1.791)*	-10.979 (-2.294)*	-10.784 (-1.839)*	-12.715 (-2.579)*
D_{int}	-1.588 (-0.683)	-1.335 (-0.579)	-1.419 (-0.626)	-1.044 (-0.458)	-1.117 (-0.499)	-1.530 (-0.643)	-1.711 (-0.730)
D_M	-0.106 (-1.191)	-0.095 (-1.071)	-0.095 (-1.084)	0.011 (0.125)	0.011 (0.125)		
D_{MM}						-1.368 (-1.042)	-1.443 (-1.112)
$\bar{R}^2$	0.277	0.299	0.268	0.434	0.403	0.384	0.345
DW	2.304	2.267	2.263	2.287	2.282	2.155	2.136

Notes: Figures in parentheses are t-ratios; * and ^ are significant at 5% and 10% confidence levels, respectively. The number of observations is 47 for all the regressions. The first differences of the variables are used for all the regressions, because using the original variables results in low DW values, which range from 1.480 to 1.574. Note that the null hypothesis for the coefficient of $(M/Y)\dot{M}$ is Ho = -1 in equations (8) and (8a).

Table A.1. GDP, exports, imports, labour, capital and prices, 1953-2000

	Y	Growth of *Y*	*X*	*M*	Growth of *K*	Growth of *L*	*RPI*
1953	824	15.60	35	46	12.27	3.06	103.40
1954	859	4.20	40	45	12.61	2.62	102.30
1955	910	6.80	49	61	10.96	2.23	101.00
1956	1028	15.00	56	53	11.25	2.69	100.00
1957	1068	5.10	55	50	11.28	3.18	101.50
1958	1307	21.30	67	62	15.42	7.66	100.20
1959	1439	8.80	78	71	18.29	4.77	100.90
1960	1457	-0.30	63	65	13.43	-1.36	103.10
1961	1220	-27.30	48	43	4.89	-1.12	116.20
1962	1149	-5.60	47	34	2.20	0.06	103.80
1963	1233	10.20	50	36	3.90	2.04	94.10
1964	1454	18.30	55	42	5.57	3.47	96.30
1965	1716	17.00	63	55	7.63	3.73	97.30
1966	1868	10.70	66	61	9.28	3.67	99.70
1967	1774	-5.70	59	53	5.43	3.67	99.30
1968	1723	-4.10	58	51	5.38	3.48	100.10
1969	1938	16.90	60	47	6.20	3.84	98.90
1970	2253	19.40	57	56	10.15	3.86	99.80
1971	2426	7.00	69	52	10.05	3.54	99.30
1972	2518	3.80	83	64	8.56	2.03	99.80
1973	2721	7.90	117	104	9.10	1.44	100.60
1974	2790	2.30	139	153	8.29	2.09	100.50
1975	2997	8.70	143	147	8.50	2.05	100.20
1976	2944	-1.60	135	129	7.00	1.94	100.30
1977	3202	7.60	140	133	7.31	1.57	102.00
1978	3624	11.70	168	187	8.84	1.69	100.70
1979	4038	7.60	212	243	8.46	2.07	102.00
1980	4518	7.80	271	299	7.83	2.72	106.00
1981	4862	5.20	368	368	6.78	3.24	102.40
1982	5295	9.10	414	358	6.93	3.41	101.90
1983	5935	10.90	438	422	7.21	3.05	101.50
1984	7171	15.20	581	621	8.15	3.16	102.80
1985	8964	13.50	809	1258	10.26	3.63	108.80
1986	10202	8.80	1082	1498	9.82	3.15	106.00
1987	11963	11.60	1470	1614	9.40	2.88	107.30
1988	14928	11.30	1767	2055	9.68	2.93	118.50
1989	16909	4.10	1956	2200	8.77	2.38	117.80
1990	18548	3.80	2986	2574	8.16	8.73	102.10
1991	21618	9.20	3827	3399	8.08	7.94	102.90
1992	26638	14.20	4676	4443	10.01	1.28	105.40
1993	34634	13.50	5285	5986	12.85	1.21	113.20
1994	46759	12.60	10422	9960	12.44	1.25	121.70
1995	58478	10.50	12452	11048	11.44	1.18	114.80
1996	67885	9.60	12576	11557	11.09	1.22	106.10
1997	74463	8.80	15161	11807	10.73	1.21	100.80
1998	78345	7.80	15232	11626	11.06	0.80	97.40
1999	82067	7.10	16160	13737	10.51	0.71	97.00
2000	89404	8.30	20635	18639	10.28	0.85	98.50

Notes: *Y* = GDP at current prices, *X* = export value at current prices, *M* = import value at current prices, *K* = capital stock value at 1990 constant prices, all in 100 million yuan; *L* = labour employment (10,000 persons, year-average figures); *RPI* = retail price index (previous year = 100). All growth rates are in real terms, with those of *X* and *M* being deflated by *RPI*.

Table A.2. Testing unit-root and cointegration

Variable	ADF (without trend)
$\dot{Y}$	-5.384**
$\dot{X}$	-4.765**
$\dot{M}$	-5.122**
ln$Y$	0.465
ln$X$	0.997
ln$M$	0.369
Δln$Y$	-5.191**
Δln$X$	-4.717**
Δln$M$	-5.104**
ln$Y$ = f (ln$X$)	-2.919^
ln$X$ = f (ln$Y$)	-2.639^
ln$Y$ = f (ln$M$)	-2.975*
ln$M$ = f (ln$Y$)	-2.734^

Notes: The critical value of the ADF (augmented Dickey-Fuller) statistic in the vincinity of 50 observations is -3.578 at the 1% level of significance, -2.926 at the 5% level of significance, and -2.601 at the 10% level of significance. These are denoted by **, * and ^, respectively. Note that, in this table, *Y*, *X* and *M* are real values at 1953 constant prices.