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**WILL THE GROWING TRADE GAP SINK VIET NAM?  
SOME EXPLORATORY ECONOMETRICS**

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## Will the growing Trade Gap sink Viet Nam?---some exploratory econometrics

*Abstract:* Viet Nam's rising external deficit currently exceeds 10 percent of GDP, a level which although easily funded by capital inflows is causing alarm to donors. We argue that the problem may be self correcting where capital inflows are directed mainly to investment, where public and private investment are complementary and investment efficiency increases. Using pooled data, cointegration analysis and a 'general to specific' approach, a non-conventional econometric model is estimated in its most parsimonious form and macroeconomic simulations run up to 1999. The results show the trade gap narrowing significantly. If these results are borne out in practice, current obstacles to trade reform and to fomenting faster private sector growth may prove easier to overcome.

### 1. Introduction

In 1996 Viet Nam's GNP growth was over 9 percent; the annual average for the preceding five year period was 8.2 percent. In October 1996, inflation was down to an annual rate of under 3 percent and at the time of writing (the summer of 1997) inflation is below 2 percent on an annual-equivalent monthly basis. Since 1991, the share of Government revenue has almost doubled and currently stands at 25 percent of GNP. Equally, gross capital formation has risen from 15 percent of GDP in 1990 to almost 30 percent in 1996, a figure which in part reflects the very rapid growth of foreign direct investment (FDI) and the accelerated pace of official development assistance (ODA) disbursements. The estimated share of Gross National Savings in 1996 was 18 percent. Although there has been a 9 percent appreciation in the Real Exchange Rate (RER) since January 1993,<sup>1</sup> exports over the same period have grown at an average rate of 28 percent per annum and are more diversified.<sup>2</sup>

One might conclude that Viet Nam's record is exemplary were it not for the fact that the current account deficit has grown from 2 percent of GDP in 1990 to 7.5 percent in 1993 to nearly 12 percent in 1996.<sup>3</sup> The World Bank (WB) *inter alia* recently described the country's external account

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<sup>1</sup> See World Bank (1996), Figure 1.4, page 13.

<sup>2</sup> New (non-traditional) export categories which have grown rapidly are garments, footwear, and processed agriculture commodities such as coffee, tea cashews, and rubber

<sup>3</sup> See IMF (1996a: 129); as Kokko (1977) notes, South Korea, Malaysia, Singapore, Sri Lanka and Bangladesh all have had trade deficits larger than 10 percent at some time since 1970 which subsequently declined, though the reversal has been most notable in the high-growth countries.

deficit as now being 'unsustainable'.<sup>4</sup> Even the most sympathetic observers sense danger signals.<sup>5</sup> Although inflation is flat, the view is growing that Government may need to take immediate steps to remedy the situation by means of expenditure cuts, exchange rate correction and rapid trade liberalisation and SOE divestiture.

This paper uses an exploratory econometric model to examine in what sense if at all the external account deficit is 'unsustainable'. An orthodox CGE model would make exports and imports respond to the real exchange rate (RER) and GDP growth. Private investment would be constrained by domestic savings and government 'crowding out'. Typically, the cure for excessive absorption would involve cutting government expenditure. The usual 'two-gap' assumption would mean that under conditions of an elastic supply of foreign savings, domestic savings would be the binding constraint so that increased foreign capital inflows would tend to worsen the current account situation. These orthodox assumptions are implicit in much contemporary policy discussion.

*Per contra*, the model set out below assumes that both exports (through technology imports) and public investment are foreign-exchange constrained while the latter 'crowds in' private investment. In consequence, although additional foreign capital injections result in import growth in the short term, in the longer term exports may grow faster enabling the current account deficit to close. The salient feature of the econometric analysis is that the limited available time-series is dealt with using pooled time-series and cross-section data and cointegration analysis, while Hendry's 'general to specific' method ensures that non-significant variables are discarded to arrive at an estimated model which is robust but parsimonious.

The remainder of the paper is set out as follows. Section II examines the problem of the current account deficit. The key question posed is whether the continued inflow of foreign capital can in future generate exports at a rate which closes the current account deficit. A testable model is sketched. Section III examines the data. A brief account is given of the problem of data consistency and of how pooled data has been used to get around the degrees-of-freedom problem. Sections IV and V set out the basic model and its disaggregated version. Section VI reports on model estimation. The conclusions set out in Section VII confirm that the use of contemporary econometric analysis yields results which—provisionally at least—bear out the view that import use and investment efficiency are improving such that the trade deficit can fall without sacrificing growth. In short, prospects for the external account may considerably be brighter than currently assumed.

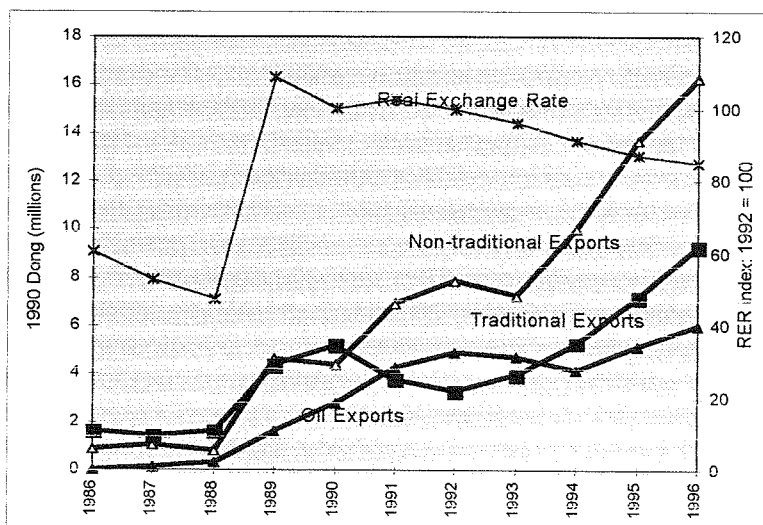
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<sup>4</sup> See World Bank (1996) and Kokko (1977), the latter for an extensive discussion of current trade policy.

<sup>5</sup> See Fforde (1996).

## II. The External Deficit Problem

Figure 1: Major Export Components and RER, 1986-96



The conventional wisdom on the external account problem goes roughly as follows. Viet Nam's external current account has been in permanent deficit since 1990 necessitating large injections of foreign savings. If the trade balance proves to be an endemic problem the country will remain too vulnerable to possible future shocks. Even if no shocks occur the external deficit can have at least three serious consequences.

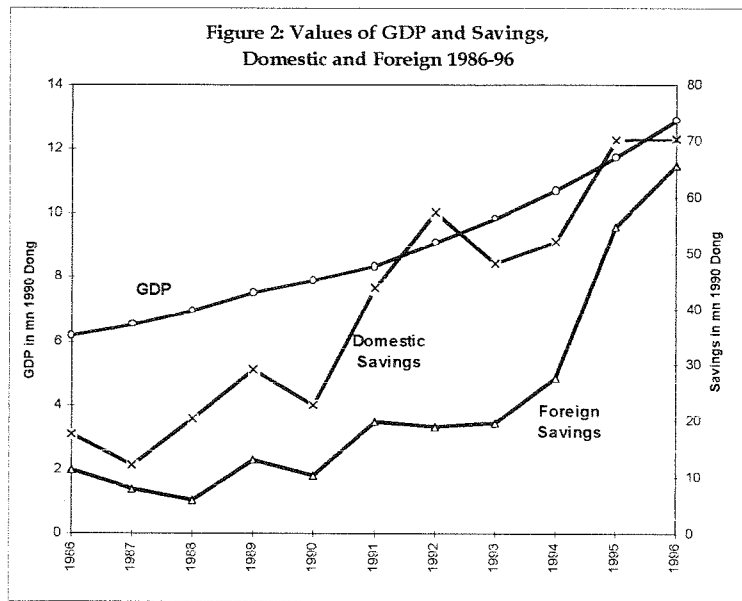
First, Viet Nam's continued reliance on large overseas capital inflows can lead to 'Dutch disease' (Kokko, 1997).<sup>6</sup> Second, a rise in foreign savings may lower domestic savings—the 'Griffin effect' (Griffin, 1970) Third, future liberalisation of commercial policy may adversely affect profit expectations amongst foreign investors thus slowing FDI inflows to an extent which would choke off GDP growth.<sup>7</sup> A variant of this argument has recently been put by Vu *et al* (1996) who foresee the reduction in effective protection entailed by Viet Nam's adherence to the Asian Free Trade Area (AFTA) causing a substantial reduction in FDI inflows. Since the public sector comprising central government and the SOEs is the major recipient of foreign inflows (both ODA and the lion's share of FDI), the conventional wisdom is that an economic strategy aimed at reducing the current account deficit should start by cutting back on the role of the public sector.

Funding the current deficit will not greatly increase Viet Nam's overseas indebtedness; the debt service ratio arising from non-FDI inflows is projected to remain the single-digit range for the next two decades (IMF, 1996b: 31). Interestingly, Figure 1 shows that despite RER appreciation over the period under study (especially after the overshooting of the nominal exchange rate in 1989), exports have risen at an accelerating rate. It would be difficult to predict a reversal in this trend should a foreign financial shock occur—as the Dutch disease story suggests.

<sup>6</sup> Kokko appears to define 'Dutch disease' purely in terms of a real exchange rate appreciation caused by a windfall capital inflow. Strictly speaking, 'Dutch disease' occurs where spending patterns or resource allocations affected initially by the foreign financing boom cannot be reversed when the boom is over (Vos, 1989).

<sup>7</sup> An argument of a different nature is that because rapid growth typically spawns various diseconomies—environmental pollution, increasing inter-household and inter-regional inequality, the growth of an urban army of underemployed and so on—any sudden slowdown or reversal will leave the State politically less legitimate and more vulnerable, hence in a weaker position to deal with such problems.

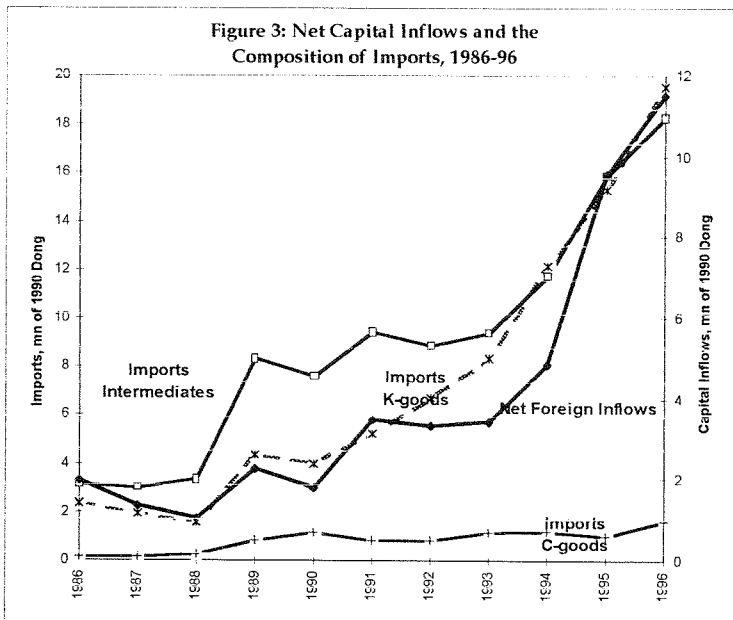
Similarly, Figure 2 shows a steep increase of domestic savings in real terms, sharper even than the



increase in foreign savings over the same period; it is apparent that no *prima facie* evidence exists for a Griffin-type inverse correlation between domestic and foreign savings.<sup>8</sup>

The current account deficit is driven by foreign inflows on capital account, mainly FDI.<sup>9</sup> The external current deficit is 'unsustainable' only if over-absorption comprises of high consumption at the expense of

investment or if investment fails to bring about a reduction in future deficits. Once again, the data (Figure 3) show that foreign savings is being used mainly to finance the import of capital and intermediate goods, which adds to productive capacity and/or increases current capacity utilisation. How this affects export growth is the central question posed below.



In our view, the export function in Viet Nam is not so much price-determined as import- and technology-constrained while levels of nominal and effective protection seem no higher than for many Southeast Asian NIEs in their early development stage.<sup>10</sup> The salient question is to what extent imported investment and intermediates goods re-emerge as exports?<sup>11</sup> This can happen directly where private or public investment is used to modernise the capital stock producing goods and

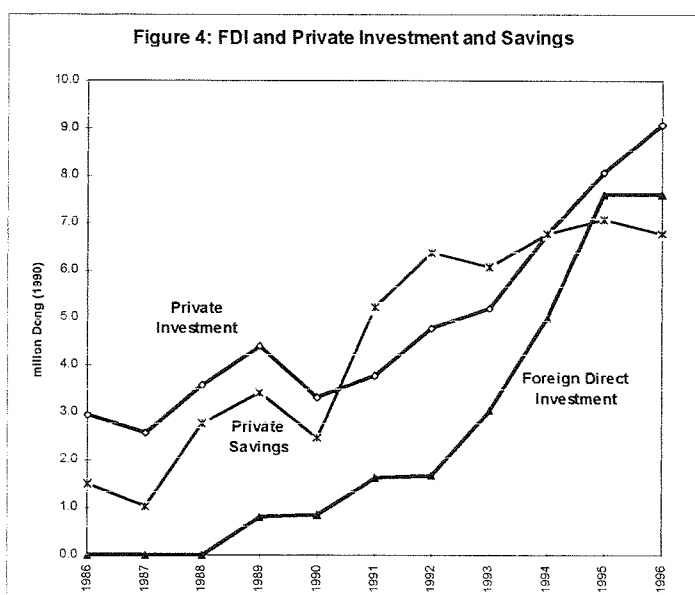
<sup>8</sup> Nor do we argue from Figure 2 that any necessary direct complementarity exists between the two sources of savings.

<sup>9</sup> For 1994-96, net FDI accounted for about 90 percent of the current deficit (IMF, 1996b: 30).

<sup>10</sup> Kokko (1997) estimates weighted average nominal tariff protection in 1996 to be of the order of 15 percent; at the same time, it must be added that substantial non-tariff barriers exist and that the objectives of Viet Nam's commercial policy are still unclear.

<sup>11</sup> Kokko (1977: 15) argues that since the country's main exports (eg, rice, coffee, light manufactures) are not import intensive, "it is unlikely that the export sector has been the main destination for the investment boom"; this misses the point that new import-using export industries (eg, garments) are beginning to emerge as the technology embodied in FDI is absorbed.

services which are internationally competitive; it can happen indirectly because the public sector concentrates on modernising social and economic infrastructure enabling export industries to develop; ie, where public sector investment 'crowds in' export-orientated investment. Since it takes time to modernise infrastructure and absorb new, internationally competitive technologies, one would expect export growth to lag behind import growth for a time. Ultimately, though, exports should 'take off' and the external deficit should begin to narrow. This seems as at least as plausible a scenario for Viet Nam in the remainder of this decade as the more orthodox scenario set out initially .



The main thrust of the paper can be summarised by the following set of hypotheses. First, while no simple 'Griffin effect' exists for Viet Nam (ie, domestic and foreign savings shares do not appear to be inversely related), a roundabout form of Griffin effect might exist if foreign-funded public investment were found to 'crowd out' private investment and savings.<sup>12</sup> The alternative hypothesis adopted here is that ODA and FDI-driven public investment are required to 'crowd

in' in private investment and savings<sup>13</sup>. In exploring this relationship sketched graphically below (see Figure 4), we hypothesise a 'public investment constrained' private investment function; ie, public investment is treated as a policy variable 'crowding-in' private investment. In treating public investment as a policy variable, we do not exclude its correlation with ODA and/or FDI. What is explored, rather, is the different impact capital inflows may have on domestic and foreign private investment<sup>1</sup>.

Centrally, if export growth is constrained by import capacity and technology in new investment and if public investment 'crowds in' private investment, even assuming foreign capital inflows continue to grow no faster than their present rate, each unit of foreign capital should generate higher level of exports in future. This implies that the external gap will close. Once our model is estimated, a simulation can be run to test whether under reasonable assumptions about the continues growth of

<sup>12</sup> Following Thirwall (1989), the assumption is that private investment determines private savings and not the other way round . In the aggregate, Fazzari (1995) shows that even in the USA aggregate savings ultimately result from government spending and private investment.

<sup>13</sup> A similar relationship, from budget deficits to national savings is proven by Eisner (1994) using USA data 1972-1990. If the 'crowding-in' hypothesis is not borne out, one would test 'crowding out'.

foreign inflows, the external gap increases or decreases. We suggest this as an appropriate test of whether the gap is or is not sustainable.

### **III. The data**

The first year of the data set constructed is 1986; not only is earlier data unreliable but, given the nature of the structural changes in the economy since the late 1980s, earlier data would be misleading. Furthermore, discrepancies exist in data published by different sources, particularly in recent years. The approach taken here is to assume that the best available data are those reported by the main international institutions, the World Bank (WB) and the IMF.<sup>14</sup> The sequence of work is as follows. A macroeconomic data sheet is first constructed using World Bank Tables and International Monetary Fund statistics. Secondly, these two sources are updated using the most recent WB and IMF reports prepared by their country staff teams. Furthermore, inconsistencies between these various sources are adjusted to comply with the most recent data sources at hand.<sup>15</sup> ADB (1996a) is used to update the main time series to 1996<sup>16</sup>.

We are aware that the more recent the data, the more provisional it is likely to be. Even an eleven-year data series constructed is a weak platform from which to launch any sort of serious econometric work. Fortunately, most of the available data can be disaggregated (into sectors or institutions), making it possible to 'pool' these cross section data into a time series framework. The choice of disaggregated data has not only helped resolve the 'degrees of freedom' problem, it has also illuminated the different possible impact of capital inflows on imports of capital goods, intermediate inputs and consumption goods, as well as the price responsiveness of oil, traditional and non-traditional exports. Similarly, different estimates for productivity changes of the agriculture,

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<sup>14</sup> Basic data sheets were constructed using the latest CD-ROM versions of the WB Tables, WB Debt Tables, and IFS statistics, complemented with (staff) Country Reports from these institutions (WB/IMF staff reports have the advantage of taking into account official government data.). We have accommodated inconsistencies between WB and IFS data, and between these and official government data, by making adjustments on components which are least likely to affect the outcome of the exercise. Hence, domestic absorption is calibrated by adjusting the level of military expenditures and of private consumption (both exogenous to our model) trying to keep these two figures in line with reported data on public and private savings (WB figures on the structure of consumption----private and public---are re-arranged to match IMF figures as reported in IMF Staff Country Report 96/145, pp.59 and pp.92. The total consumption figure is left unchanged, while private consumption is slightly modified to let the figure for public expenditure coincide with the government budget as represented in pp.92 of the IMF Staff C.R.)

Similarly, seeming inconsistencies in the external sector are dealt by adjusting services and factor payments (not only are these exogenous in our model, but also it are these items differently considered in each source; eg the "trade balance" reported in the IMF Staff CR.'s include Non Factor services but exclude Factor payments; which is done differently in the WB's Country Reports). On the other hand, capital inflow figures reported by international institutions may show differences on an item per item basis, while the totals are more in line with each other. When this was not the case, especially in more recent years, 'net foreign inflow' variable was cross-checked with calculated first differences of the debt stock variables reported in WB CD-ROM Debt Tables.(

Finally, rates of economic growth and other parameters involving real variables reported by the different sources were made consistent by adjusting the GDP deflator (which was then used for the calculation of the 'real exchange rate').

<sup>15</sup> See IMF (1996a) and (IMF 1996b).

<sup>16</sup> See ADB, "Asian Development Outlook 1996 and 1997".



industrial and service sectors in response to foreign inflows and infrastructure investment are allowed for<sup>17</sup>. This will become clear in subsequent sections.

### ***V. The basic model***

In order to test the hypotheses set out above, a partial model is proposed in the tradition of disequilibrium approaches. Economic growth is constrained in the short run by aggregate demand (exports net of imports plus domestic absorption). Because of the steady growth of aggregate supply due to investment and an historically low ICOR, prices are not considered a destabilising factor and the economy operates with overcapacity. On the other hand, if the export demand does not catch up with imports in order to push aggregate demand up, excess capacity is not used for output growth. In this case, the external reserve account (the closure for the external balance) will fall (eventually to a level resulting in economic crisis).

The model, in its parsimonious form, starts with the current account identity:

$$(1) \quad CAD \equiv M - E - \overline{Nbal}$$

where *CAD* is the current account deficit, *M* merchandise imports, *E* merchandise exports and *Nbal* (exogenous) the net service and factors balance. Further, one should note that both import and export levels are endogenously determined (see below), while foreign inflows and the balance of factors and services are driven by the 'rest of the world'. The external balance is 'closed' by means of the level of international reserves.

Our import and export functions are as follows:

$$(2) \quad M = m_0 + m_1 \overline{FTw} + m_2 I + \varepsilon$$

$$(3) \quad E = e_0 + e_1 \overline{RER} + e_2 M + e_3 I_{(-1)} + \gamma$$

Above, *FTw* represents total net foreign inflows including FDI, *I* gross domestic investment and *RER* the real exchange rate (defined as the ratio of international to domestic prices times the nominal exchange rate).

These equations, if shown to be empirically significant, suggest, firstly, that the capital inflows stimulates imports (indicated by the coefficient  $m_1$ ) and—from to identity (1)—have repercussions on the current account deficit. Secondly, an increase of the level of exports will depend not only on

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<sup>17</sup> As rightly pointed out by an anonymous referee, pooling disaggregated (cross section) data in a time series analysis may introduce additional "noise" in an OLS regression if the data sets are not fully independent. But this is very rarely the case in macroeconomic data sets (often, as said in jest in first year econometric classrooms, while one econometrician is assuming independence among regressors, another econometrician somewhere else is regressing one of those "independent regressors" on the others in order to show that a strong linear relationship exists!). In particular, there is often complementarity between import goods, between exporting sectors and between domestic and external (private) investment, which are our 'presumably independent' data sets. However, tests for stationarity and cointegrated relations, as well as normality of residuals did take care of these possible interrelations.

price indicators and installed capacity by sector, but also on the current level of imports (as indicated by the coefficient  $e_2$ ) which in turn then depends on foreign inflows.

Output is constrained by the aggregate demand. A critical constraint may be that of imports growing more rapidly than exports, an issue that is investigated by the equations above. However, for output to grow without generating inflationary pressure or related sources of instability, fixed capital productivity is assumed stable. Hence aggregate supply is driven by investment:

$$(4) \quad \Delta X \cong k Itot \quad ; \quad \text{or} \quad X \cong X_{(-1)} + k Itot$$

where  $X$  is output and  $k$  stands for the productivity of gross investment (ie, for the inverse of the  $ICOR$ ).  $Itot$ , here, is *total gross domestic investment*. For the purpose of our exercise, we disaggregate this variable by taking into account the institutional split into public and private.

Secondly, we pay specific attention to that part of private investments which is majority-owned by foreign investors; in order to better estimate the different impact that foreign capital inflows have on both types (ownership) of investment<sup>18</sup>. More precisely, the variable for GDI (gross domestic investment) consists of  $Ip$ , domestically-owned public and private investment plus any foreign-owned investment,  $If$ .

$$(5) \quad Itot \cong \bar{I}g + Ip + If \quad ; \quad \text{or} \quad Itot \cong \bar{I}g + Ipf$$

The nature of this identity is further refined by establishing a relation between the public ( $Ig$ ) and private components ( $Ip$  and  $If$ ) of investment. If, moreover, one takes the level of public investment as a policy variable, total investment is subject to endogenous changes:

$$(6) \quad Ipf = i_0 + i_1 \Delta X_{(-1)} + i_2 \bar{I}g + i_3 \bar{S}pf + \eta$$

equation 6 indicates<sup>19</sup> that both domestic and foreign private investment responds to an accelerator (the lagged level of output), to injections of public investment ('crowding-in' measured by the coefficient  $i_2$ ) and is further constrained by exogenous savings  $Spf$ ; (ie, savings from domestic and

<sup>18</sup> An anonymous referee has correctly pointed out that such a disaggregation may be confusing. However, WB tables (CD ROM) make the specific split in their accounting sheets, possibly in order to make more evident the role of external financing on the structure of (fixed) domestic investment. Our disaggregation entails to make the split of GDI into ownership in the belief that ownership matters in terms of response to financing (as a matter of fact, in an economy largely driven by foreign inflows, to talk of the response of the "private" sector to external financing can be misleading, to say the least). In our calculations, we have taken the variable defined as FDI in the WB tables and applied to this variable the structure detailed in the tables reported in Institute of World Economy (1995, pp. 203) and in UN (1996, pp.20) in order to estimate the proportions of private investment from foreign and domestic financial sources. The same could have been done for the public sector, but in our case such a distinction was not strictly relevant to make our point (rather, it was sufficient to 'assume' that there is a correlation between foreign financing and public investments).

<sup>19</sup> See Izurieta, A. (1992) MA thesis, ISS, unpublished for a formal justification, and also FitzGerald, Jansen and Vos (1992) for a further elaboration of the accelerator taking into account foreign savings.

foreign sources). Note that, in contrast to the formulation used by some authors<sup>20</sup>, it is the current level of public investment which is taken as a 'crowding-in' indicator, not the lagged level.

### ***V. The extended model***

The above model cannot possibly be solved using an 11 year time-series. Exploring the dynamics of the model requires far more disaggregated data. It is apparent from examining plots of the variables under consideration that not only are there differences in the hypothesised relations using disaggregated data, but also that the influence of the independent on the dependent variables may be of opposite sign. The use of aggregate data not only causes information loss, but it can lead to statistically non-significant results<sup>21</sup>.

For example, as argued in the Griffin debate (Griffin, 1970; Heller, 1975; Mosley, 1987; White, 1992), foreign capital inflows may raise consumption (particularly of imported consumer goods) rather than enhance domestic savings. It would thus be useful to re-specify equation 3 such as to distinguish between "productive" imports (fixed capital and intermediate inputs) and consumption goods. From Figure 3 above there appears to be a far more positive relationship between capital inflows and imports of capital- and intermediate-goods than with those of consumption goods. Also, it will be useful to examine whether imports generated by foreign inflows are used for increasing the capital stock (assumed to be represented by increased imports of capital goods) or raising capacity utilisation (increased imports of intermediate inputs). Indeed, Figure 3 seems to suggest that foreign capital inflows are associated with higher capacity utilisation of the existing plant and equipment rather than increasing the capital stock.<sup>22</sup>

Equation 2 above has thus been reformulated to allow for these qualifications by using disaggregated data for imports of capital goods, intermediate inputs and consumption goods. From an econometric point of view, the available degrees of freedom can be increased by pooling these data into a single vector. Different possible responses of the independent variables are then captured by including 'dummy' variables both for the constant terms and slopes. Analytically, note that  $\mathbf{M}_{(k,i,c)}$  is now a vector constructed by pooling the series for imports of capital goods, of intermediate inputs and of consumer goods, and that  $\mathbf{U}_{i=1,2}$  are the usual dummies:

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<sup>20</sup> See for example Serven and Solimano (1992) or Erenburg (1993) for a survey of the empirical literature. The public investment variable is not lagged both by assumption and by empirical observation. Further, econometric hypothesis testing proved that this is the case. In our view, the fact that public investment seems to generate a simultaneous response of the private sector has little to do with presuming a higher efficiency of the Vietnamese public sector than that evident in other countries. Rather, it seems to originate in the yet "central planning oriented" minds of entrepreneurs who seem to pay careful attention to the long term "Public Investment Programmes" (Doi Moi included) of authorities.

<sup>21</sup> See Baltagi (1995) for a formal elaboration.

<sup>22</sup> Actually, such a difference turns out to be statistically non-significant, perhaps due to factors exogenous to the model.

$$(2') \quad M_{(k,i,c)} = m_0 + (m_0^1 - m_0)U_1 + (m_0^2 - m_0)U_2 + \\ m_1 \overline{FTW} + (m_1^1 - m_1)U_1 \overline{FTW} + (m_1^2 - m_1)U_2 \overline{FTW} + m_2 I + \varepsilon$$

Similarly, equation 3 can be used to capture the different possible responses of traditional and non-traditional exports to real exchange rate (*RER*) movements and to the level of investment<sup>23</sup>. One can hypothesise that while a change in the domestic/world price ratio must affect all sectors in the long run, its short-run impact is on the non-traditional sector. Visual inspection of Figure 1 above suggests that the behaviour of the *RER* and the various export components is relatively uniform. While each export component may show a different lag structure in terms of responsiveness to prices (denoting an ambiguous response in the short run) the sequences of peaks and troughs of the curves suggest that, properly corrected by the trend, these series exhibit a positive long run relationship.

Which export sectors are most sensitive to what sort of investment? Data observation suggests that disaggregating the investment variable between public, private and foreign institutions adds little to the analysis. Hence we use the aggregate level of investment as an explanatory variable for the three exporting sectors (oil, traditional, non-traditional)<sup>24</sup>. The results should say something about the positive or negative impact of new investment on the disaggregated export sectors. In practice, equation 3 is reformulated by using a vector  $E_{(o,t,n)}$  pooling data on oil exports, traditional and non-traditional exports (as above, the pooled data set expands over a period three times longer). Dummy variables are introduced accordingly.

$$(3') \quad E_{(o,t,n)} = e_0 + (e_0^1 - e_0)U_1 + (e_0^2 - e_0)U_2 + \\ e_1 \overline{RER} + (e_1^1 - e_1)U_1 \overline{RER} + (e_1^2 - e_1)U_2 \overline{RER} + e_2 M + e_3 I_{(-1)} + \gamma$$

The investment function (equation 6) can also be used to generate some interesting hypotheses when disaggregated data is used. Private investment is divided into domestic and foreign-owned components, (*I<sub>p</sub>*, *I<sub>f</sub>*). Moreover, while the accelerator and the 'crowding-in' variable can be presumed to act in a similar manner on both types of private investment, the savings variable needs to be specified further if the savings constraining mechanism is to be properly estimated. Figures 2 and 4 above seem to support this approach as critical fluctuations among savings components will be lost in the aggregate. Hence, we will distinguish between domestic savings (affecting primarily domestically-owned investment and net foreign inflows (chiefly affecting investment projects where ownership is mainly foreign). Accordingly, two new vectors are constructed by pooling

<sup>23</sup> It seemed plausible that new (non-traditional) exports are more price responsive and also less influenced by public investments than traditional exports. Moreover, traditional (non-oil) exports may be more dependent on prices and less on public investments than oil, while the oil industry requires huge investments in infrastructure but once the capacity is built, price differences may not matter that much.

<sup>24</sup> Traditional exports are rice, cola, rubber, tea and coffee; all others are 'non-traditional' while oil is shown separately; see World Bank (1995), Statistical Annex, Table 3.2

disaggregated data into a time series twice as long as the original. These are: the  $I_{(p,f)}$  vector comprising private domestic investment and private foreign investment; and the  $S_{(p,f)}$  vector comprising domestic savings and net foreign inflows. As before, the reformulated equation is estimated by using dummy variables for coefficients and slopes.

$$(6') \quad I_{(p,f)} = i_0 + (i_0^2 - i_0)U_2 + i_1 \Delta X_{(-1)} + i_2 \overline{I}g + i_3 \overline{Spf} + (i_3^2 - i_3)U_2 \overline{Spf} + \eta$$

## VI. Model estimation and results

Before discussing the results, a few more remarks of a technical character will be in order. The model is estimated using recent cointegration techniques for time series<sup>25</sup>. Moreover, cointegration is a recognised methodology for dealing with simultaneity of relations embedded in the model.<sup>26</sup> After verifying the existence of unit roots and the cointegration rank, the long run relationship is estimated and later introduced as an error correction mechanism (ECM) in the short run equation (first differences). Stationarity of variables, normality of residuals and absence of autocorrelation are carefully checked. Variables in the three estimated equations appeared to be cointegrated of order (1,0), while the residuals in both the long-run and the short run forms are stationary at 5% level of significance. As argued by various authors (Thomas, 1993; Rao, 1995; Griffiths et al., 1993), results obtained in this way are 'super-consistent' and therefore offer reliable estimators of steady state relationships<sup>27</sup>. In the estimation of long and short run dynamics we adopt the Engle and Granger 'two-stage' procedure which is usual<sup>28</sup>. Adopting the 'general to specific' approach (Hendry and Richard, 1983), equations are set out in their most general form and a 'testing down' procedure is used to arrive at the most 'parsimonious' expression; ie, the simplest that encompasses the

<sup>25</sup> For each of the equations the same sequence is followed, namely: (i) the table of variables under investigation is reported, and unit roots for each of the variables is estimated until finding stationarity; (ii) Johansen cointegration tests are performed in order to infer about the existence and minimum rank of the cointegration vector; (iii) the long run equation is estimated according hypothesised relations above, and its residual is stored for further use in the estimation of the equation in differences; (iv) following a "two stage" approach, the short run equation (in differences) is estimated using all hypothesised independent variables and the one-lagged estimated residual of the long run equation; (v) along with, all estimated OLS equations are subject to the typical tests of goodness-of-fit, significance, covariance and correlation (especially where multicollinearity is suspected) and residual tests of normality, non-autocorrelation, and stationarity.

<sup>26</sup> The argument, put forward by many authors, is a mere corollary of Stock (1987)'s prove that the estimators of the cointegrated relationship are consistent regardless of the existence of a simultaneous correlation between the disturbance and the regressors in the model.

<sup>27</sup> Only asymptotically properties of estimators in cointegrated relationships are 'excellent'.

<sup>28</sup> We are aware of possible benefits of adopting the alternative approach, that is, re-estimating the short run equation with the lagged variables in levels altogether in order to arrive at the final form of the behavioural equation. However, the two-stage method is here more reliable as it does not necessitate a large number of 'dummies' as would otherwise be the case.

significant relations encountered so far.<sup>29</sup> Our results conform to theory and largely bear out the initial hypotheses. Our results are reported below<sup>30</sup>.

For ease of presentation, the estimated equations are shown by sector.<sup>31</sup> This simplifies picking out important differences or similarities between sectors. The standard statistics (Rsq, DW, etc.) of each equation are reported with the equations. The significance level of all estimated parameters is between 1% and 5% (the equations reported below result from a process of excluding all non-significant regressors).

### **Equation 2: 'Foreign inflow induced' imports**

*Imports of capital goods:*

$$\Delta M_k = 1.03 \overline{\Delta FTW} + 0.34 \Delta I - 0.55 \{ M_k - (-1.69 \times 10^6 + 1.24 \overline{FTW} + 0.51 I) \}_{(-1)} + \varepsilon_k$$

*Imports of intermediate inputs:*

$$\Delta M_i = 1.03 \overline{\Delta FTW} + 0.34 \Delta I - 0.55 \{ M_i - (+1.71 \times 10^6 + 0.87 \overline{FTW} + 0.51 I) \}_{(-1)} + \varepsilon_i$$

*Imports of consumption goods:*

$$\Delta M_c = -0.23 \overline{\Delta FTW} + 0.34 \Delta I - 0.55 \{ M_c - (-1.69 \times 10^6 - 0.36 \overline{FTW} + 0.51 I) \}_{(-1)} + \varepsilon_c$$

(  $R^2 = .72$  ;  $R^2_{adj} = .68$  ;  $D.W. = 1.76$  ;  $F = 20.4$  ;  $\varepsilon$ 's are normal, stationary at 5%, and non-autocorrelated ).

### **Equation 3: Import dependent exports, the RER and investment**

*Oil exports:*

$$\Delta E_o = 0.19 \Delta M + \dots - 0.61 \{ E_o - (-2 \times 10^6 + 371 \overline{RER} + 0.19 M \dots) \}_{(-1)} + \gamma_o$$

*Non-traditional exports:*

$$\Delta E_N = 0.19 \Delta M + 0.62 \Delta I - 0.61 \{ E_N - (-5.4 \times 10^6 + 371 \overline{RER} + 0.19 M + 0.89 I) \}_{(-1)} + \gamma_N$$

*Traditional exports:*

$$\Delta E_T = 0.19 \Delta M + 0.30 \Delta I_{(-1)} - 0.61 \{ E_T - (-2 \times 10^6 + 371 \overline{RER} + 0.19 M + 0.16 I_{(-1)}) \}_{(-1)} + \gamma_T$$

(  $R^2 = .64$  ;  $R^2_{adj} = .59$  ;  $D.W. = 1.35$  ;  $F = 13.5$  ;  $\gamma$ 's are normal, stationary at 5%, and non-autocorrelated )

<sup>29</sup> Steps along the testing down procedure for each equation are fully recorded and available upon request.

<sup>30</sup> A detailed econometric account of all tests, results and main statistics of the accepted equations is available from the authors.

<sup>31</sup> Where dummy variables are statistically significant, instead of presenting the aggregate equation including the dummies, we recalculate the coefficients and show the results disaggregated by sector.

**Equation 6: The accelerator, crowding-in and savings-constrained private investment**

*Domestic private investment:*

$$\Delta I_p = 0.41 \Delta(\Delta X)_{-1} + 1.05 \overline{\Delta I_g} + \dots - 0.99 \{ I_p - ( \dots + 0.67 \Delta X_{-1} + 0.98 \overline{I_g} + \dots ) \}_{(-1)} + \eta_p$$

*Foreign investment:*

$$\Delta I_f = 0.41 \Delta(\Delta X)_{-1} + 0.19 \overline{\Delta I_g} + 0.63 \overline{\Delta FTW} - 0.99 \{ I_f - ( -1.8 \times 10^6 + 0.67 \Delta X_{-1} + 0.12 \overline{I_g} + 0.5 \overline{FTW} ) \}_{(-1)} + \eta_f$$

(  $R^2 = .59$  ;  $R^2_{adj} = .47$  ;  $D.W. = 1.62$  ;  $F = 4.78$  ;  $\eta$ 's are normal, stationary at 5%, and non-autocorrelated )

The above results fully confirm our main hypotheses for the Vietnamese current deficit: imports are driven by capital inflows, increased import capacity allows more exports to be produced and public investment 'crowds in' private investment. Further implications can be teased out when looking at the disaggregated framework.

A first point to note is the different response of imports for productive activities (capital goods and intermediate inputs) and of imports of consumption goods to the level of foreign financial inflows. The impact of foreign capital inflows on imports is positive in the case of capital goods and intermediates but negative in that of consumption goods, both in the short run—the expressions in first differences) and in the long run—the expressions between brackets denoting the error-correction mechanism. Foreign capital also appears to draw in more imported capital goods than intermediates; the response of the former is one-and-a-half times greater than that of the latter suggesting that financial inflows are used to increase the capital stock more than to increase the utilisation of existing capacity.<sup>32</sup> Centrally, it should be noted that if foreign capital induced imports are used for investment and investment creates export capacity, the 'unsustainable trade gap' argument is wrong as indeed is borne out by the estimated results. Comparing the coefficients of the investment variables (short and long run): in equation 2 and 3, particularly in the equation for non-traditional exports, a unit of investment generates more exports than it induces imports!

Further, equation 3 indicates surprisingly that exports are not highly sensitive to the RER in the short run (and even in the long run the value of the coefficient is negligible).<sup>33</sup> Where exports rely on imports capacity, coefficients are positive in all sector functions both the short and the long run. This result confirms the main argument explicitly: foreign inflows drive the level of imports (in particular

<sup>32</sup> This may simply reflect the fact that foreign inflows are more biased to support new investment projects which logically require a higher effort in building up plants and equipment).

<sup>33</sup> In Equation 3, the correct interpretation of the RER coefficient is as follows: the (implicit) long run relation denoted in the second term on the right-hand side says that a one unit rise in the RER price index leads to VND 371 mn in additional exports in a (hypothetically established) long run relationship. Expressed in terms of elasticity, given that the averages of the RER and exports over the period are VND 5596 and VND14 mn at constant prices respectively, the response of Exports to RER changes is only 14%.

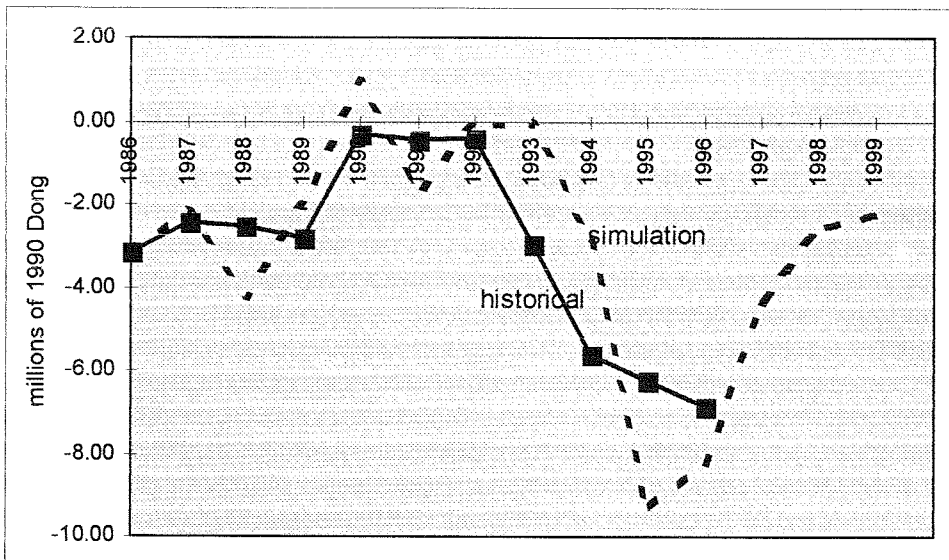
imports of capital goods and of intermediate inputs), making possible a rise in the level of exports and thus alleviating current account pressures. However, attention should be paid to the interpretation of the investment regressors in both the short and long term. Firstly, oil exports are not sensitive to investment, possibly because infrastructure investments in this sector have a long and complex lag structure. By contrast, the impact of aggregate investment on non-traditional exports is immediate (suggesting a short gestation period), while the impact of investment on traditional exports is significant if a one-period lag is used.

Equation 6 clearly confirms our hypotheses about the accelerator and the complementarity of public and private investment. The level of domestic private investment is more sensitive than that of foreign investment to a public investment injection. By contrast, it is foreign investment which seem to be financially constrained—a one unit reduction fall in the value of total foreign capital inflows (FTw) implies a reduction of 0.63 units of fixed foreign investment. The domestic investment function is not constrained by domestic savings; ie,  $S_d$  is not statistically significant in the domestic private investment function! This result together with the positive and statistically significant value of the public investment variable in these equations allows us to reject the 'crowding out' hypothesis.<sup>34</sup>

## VII. Conclusions

Having estimated the model and obtained results consistent with the relationships initially posited,

Figure 2: Viet Nam's trade deficit; historical and projected



simulations can now be carried out covering the historical period plus three extra years, 1997-99. In these three years, the salient assumptions are overseas capital inflows will increase at just over 9 percent per annum (ie, less than the 1992-96

average or equal to average 1994-96 GDP growth), that the share of public investment in GDP will remain constant as will public and private consumption. Implicitly, we force our policy variable (public investment) to grow at the same rate as net capital inflows. While simulation results have been

<sup>34</sup> This is not to deny that private investment in Viet Nam is hampered by an excessive and inefficient bureaucracy; the argument is simply that public investment (including SOE investment) does not 'hold back' the private sector.



generated for all the relevant GDP aggregates, here we report only the simulation for the trade account where its projected components have been re-aggregated. Figure 5 shows that for the historical period, 1986-96, the model simulation (broken line) corresponds quite closely to historical data (solid line).<sup>35</sup> For 1997-99, the simulation shows the trade gap—shown in constant 1990 Dong—narrowing to a level similar to that for 1993. Because of the short time-period covered by the historical data, it seems prudent not to run the simulation for a longer period. Hence, we do not conclude that the deficit will disappear, merely that in the short to medium term the situation will improve as technology transfer and improved economic infrastructure become manifest in improved import use, higher investment efficiency and a continued dynamic export performance. As noted above, the reduced trade deficit is not produced by constraining GDP growth and reducing absorption.

In summary, our findings regarding the effects of foreign capital inflows and of public investment on the main endogenous variables (imports, exports and investment productivity by sector) suggests that the strategy currently being followed in Viet Nam will in future enable exports to grow faster than imports and to create the conditions for sustained growth with macroeconomic stability. Such a pattern is mediated by an efficient utilisation of resources (especially of capital good and intermediate imports), positive synergy between public and private investment, and clear efficiency gains in all sectors with foreign savings creating a virtuous circle of high growth, increased domestic savings, and higher productivity. Looking beyond our empirical results, it seems reasonable to speculate that an 'outward orientation' strategy will become more manifest and that an increasingly efficient utilisation of foreign capital inflows will make SOE rationalisation easier rather than harder. Donors should take heart.

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<sup>35</sup> Discrepancies are mainly due to the fact that the trade gap estimate results from the aggregation of six estimates for each year (three import components and three export components).



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