

EASIER TECHNIQUES OF BALANCE OF PAYMENTS ANALYSIS

Jaanus Kroon

The trends reflected in Estonia's balance of payments statistics exert a significant impact on a small open economy like Estonia, which is exposed to changes in the external environment. Therefore, the techniques used for analysing the balance of payments, investment position and external debt have a prominent place in the instrumentarium of economists and economic policy makers.

Balance of payments statistics are widely used in different fields of policy formulation (see Table 1). This should be taken into account also in the presentation and analysis of balance of payments statistics.

Table 1. Application of balance of payments statistics in policy-making

Purpose	Relation with balance of payments	Measures
Monetary policy	<ul style="list-style-type: none"> - Analysis of the external sector of monetary policy development - Monitoring economic and price developments - International transmission of economic shocks 	Change of monetary policy to obtain price stability in the case of external shocks
Financial sector policy	<ul style="list-style-type: none"> - Identification of risks to financial stability (incl. current account sustainability, excessive risks related to the financial sector) 	Amendment of the financial sector regulatory framework and/or improvement of supervision to ensure financial stability
Fiscal policy	<ul style="list-style-type: none"> - Impact of fiscal policy developments on external sector balance 	Budget adjustment
Structural policy	<ul style="list-style-type: none"> - Changes in the international competitiveness of economic sectors and relative advantages 	Change of structural policy and trade negotiations
International financial structure	<ul style="list-style-type: none"> - Identification of the general vulnerability of and risks to the financial and non-financial sectors in the case of international financial crises by means of trade and financial flows - Identification and spread of primary global disturbances in the external balance - Determination of the factors causing instabilities in the international monetary system and elaboration of necessary measures 	<ul style="list-style-type: none"> Elaboration and improvement of supervision and transparency policies Development and implementation of the stability programmes of the IMF

The purpose of this article is to introduce a few easier and less-known analysis techniques that might prove useful for economists: namely, methods for determining the balance between the balance of payments accounts and the ratio analysis.

EQUILIBRIUM CONCEPTS OF THE BALANCE OF PAYMENTS

Balance of payments as a whole is always balanced in terms of statistics. True, errors and omissions are inevitable but this does not change the fact. In order to evaluate external balance and determine the surplus or deficit on the balance of payments, the accounts of the balance of payments are usually divided into two groups and then the resulting value of balance is compared. The following is an overview of the more interesting concepts. The majority of them are widely used in the world; some of them have been developed by the author of this article.

Standard presentation of the balance of payments or the net-worth balance

According to the **standard presentation or the net-worth balance** of the International Monetary Fund (IMF), every country that has joined the Special Data Dissemination Standard (SDDS) of the IMF has to publish its balance of payments on the basis of the following equation:

$$\underbrace{X - M + \Delta Y_f + \Delta TR}_{\Delta CA} = 0 = - \underbrace{(\Delta KA + \underbrace{\Delta FDI + \Delta PI + \Delta D + \Delta OI + \Delta IR}_{\Delta FA})}_{\Delta KFA}, \text{ where}$$

- ΔCA – current account balance;
- ΔKFA – capital and financial accounts balance;
- X – exports of goods and services;
- M – imports of goods and services;
- ΔY_f – income account balance;
- ΔTR – transfers account balance;
- ΔKA – capital account balance;
- ΔFA – financial account balance;
- ΔFDI – direct investment balance;
- ΔPI – portfolio investment balance;
- ΔD – derivatives balance;
- ΔOI – other investment balance;
- ΔIR – change in gold and foreign exchange reserves.

The standard presentation expresses a restriction in financing, which foresees that the current account deficit may not exceed the capital inflow on the capital and financial accounts and vice versa.¹ The current account shows the extent to which a country's economy uses the income created there. In terms of savings, this means using foreign savings or investing domestic savings in a foreign country.

Analytical presentations of the balance of payments

Depending on the purpose of balance of payments analysis, one alternative to the standard presentation is the analytical mode of presentation, which draws from a different structuring of the accounts or their components.

The **concept of overall equilibrium** opposes all balance of payments transactions with changes in the central bank's gold and foreign exchange reserves:

¹ According to economists David Hume and Adam Smith, $X - M = 0 = -\Delta IR$.

$$\underbrace{\Delta CA + \Delta KA + \Delta FDI + \Delta PI + \Delta D + \Delta OI}_{\Delta OB} = 0 = -\Delta IR$$

ΔOB – overall equilibrium;

$\Delta FDI + \Delta PI + \Delta D + \Delta OI$ – financial account (excl. reserves).

The overall equilibrium explains the causes of changes in central bank reserves; the interpretation of these causes depends on the exchange rate mechanism in use. If a floating exchange rate is used, then the reserves do not change without central bank's intervention, i.e. $\Delta IR = 0 \rightarrow \Delta OB = 0$. With the currency board arrangement, the balance of reserves results from the transactions of the overall equilibrium. Therefore, the concept of overall equilibrium is most suitable for describing Estonia's economy.² The overall equilibrium reflects the base money (M_b) of the balance of real cash flows from the aspect of supply and demand, indicating the theoretical direction of the exchange rate dynamics (*ex post*) if a floating interest rate arrangement were applied.

The **concept of basic equilibrium** provides for the separation of volatile and/or potentially “returning” short-term capital accounts from the rest of the accounts:

$$\underbrace{\Delta CA + \Delta KA + \Delta FDI + \Delta OI_L}_{\Delta BP} = 0 = -(\Delta PI + \Delta D + \Delta OI_S + \Delta IR), \text{ where}$$

ΔOI_L – other investment: long-term capital;

ΔOI_S – other investment: short-term capital;

ΔBP – basic equilibrium.

The basic equilibrium shows the general vulnerability of the external balance and the financing of a negative current account through long-term capital flows, and serves as an indicator of sustainability.

Developing the concept of basic equilibrium further, we can draw the debt instruments and reserves under the line in order to evaluate the sustainability of the external balance and thus monitor the extent of financing from net assets repayable.

$$\Delta CA + \Delta KA + \Delta FDI_{ND} + \Delta PI_{ND} + \Delta D = 0 = -(\Delta FDI_D + \Delta PI_D + \Delta OI + \Delta IR), \text{ where}$$

ΔFDI_{ND} ; ΔPI_{ND} – non-debt instruments;

ΔFDI_D ; ΔPI_D – debt instruments.

The **concept of monetary equilibrium** sets a monetary system's (central bank and credit institutions) net foreign assets that are liquid in international money and financial markets in compliance with the other components of the balance of payments:

² Eesti Pank publishes Estonia's balance of payments by the concept of overall equilibrium since 1994.

$$\underbrace{\Delta CA + \Delta KA + \Delta FDI + \Delta D_N + \Delta PI_N + \Delta OI_N}_{\Delta MB} = 0 = -(\Delta D_M + \Delta PI_M + \Delta OI_M + \Delta IR), \text{ where}$$

$\Delta FD_N, \Delta PI_N, \Delta OI_N$ – instruments of general government and other sectors;

ΔMB – monetary balance sheet;

$\Delta FD_M, \Delta PI_M, \Delta OI_M$ – financial sector (instruments of credit institutions).

The monetary equilibrium describes indirectly the development of monetary supply and interest rates within the floating interest rate system. Although these items are not that wide-spread, in 2000 the European Central Bank took the monetary equilibrium as the basis for elaborating the monetary presentation of the balance of payments of the European monetary system. This is used for the formulation of the euro area monetary policy, as the change in the net foreign assets of the monetary financial institutions (MFI)³ is one of the key components of the Eurosystem's broad monetary aggregate (M3):

$$\underbrace{\Delta CA_{nonMFI} + \Delta KFA_{nonMFI}}_{\Delta BOP_{nonMFI}} - \underbrace{(\Delta CA_{MFI} + \Delta KA_{MFI} + \Delta FDI_{MFI})}_{\Delta BOP_{MFI}} = 0 = \underbrace{\Delta PI_{MFI} + \Delta D_{MFI} + \Delta OI_{MFI}}_{\Delta NFA},$$

where

ΔBOP_{nonMFI} – balance of payments of non-MFIs;

ΔBOP_{MFIs} – balance of payments on the basis of the current, capital and direct investment accounts of MFIs;

ΔNFA – change in the net foreign assets of MFIs.

The **concept of liquidity** was put to use in post-war Europe, when the foreign exchange reserves of the national central bank and the commercial banks performing settlements were drawn under the line. This enabled to show the use of economy's liquidity in external markets, where local currency was not convertible. The presentation of the liquidity concept on the basis of the modern balance of payments structure would look like this:

$$\underbrace{\Delta CA + \Delta KA + \Delta FDI + \Delta PI + \Delta D + \Delta OI_{NC}}_{\Delta L} = 0 = -(\Delta OI_C + \Delta IR), \text{ where}$$

ΔL – liquidity balance;

ΔOI_{NC} – other investment (excl. foreign currency and deposits of credit institutions);

ΔOI_C – foreign currency and deposits of credit institutions.

³ ECB statistics uses the concept of credit institutions in the broader sense. Monetary financial institutions (MFI) comprise all institutions that are engaged in money creating and participate in the development of the money supply (M3). In general, this item includes credit institutions, money market funds and the financial institutions of the Eurosystem (national central banks).

By slightly changing the liquidity concept, it is possible to include also the foreign exchange reserves of the non-financial sector and general government in the total foreign exchange reserve.

A further improvement of the liquidity concept enables to use also the **concept of cash flows**, which gives an overview of the payment sources used in international economic transactions. In that case, the presentation of the balance of payments should separate the economic transaction (debit or credit) from the side of financing:

$$\underbrace{\Delta CA + \Delta KA + \Delta FDI + \Delta PI + \Delta D + \Delta L + \Delta OC}_{\Delta CFB} = 0 = -(\Delta TC + \Delta Dep + \Delta IR), \text{ where}$$

ΔCFB – cash flow balance;

ΔL – loans;

ΔOC – other capital;

ΔTC – trade credit (accounts receivable or payable);

ΔDep – currency and deposits;

$\Delta OI = \Delta TC + \Delta Dep + \Delta L + \Delta OC$.

The result shows the extent of financing of current transactions or investments with the currency on the accounts of companies, banks or households or with central bank's foreign exchange reserves, or the amounts due (trade credit).

At present, the publication and statistical analysis of Estonia's balance of payments proceeds from the standard presentation and the concept of overall equilibrium. However, the above list can be extended if necessary, depending on the purpose of analysis.

RATIO ANALYSIS

In addition to the analytical indicators found by applying equilibrium concepts, various ratios are often used in balance of payments analyses. These ratios are calculated by comparing the items of balance of payments, investment position and external debt reports between each other or with other overall economic indicators. The ratios may serve as early warning indicators of the deterioration or improvement of the external sector.

External sector analyses usually draw from the ratios of different balance of payments components and gross domestic product (e.g. $\Delta CA/GDP$, FDI/GDP), which indicate the value of a specific aggregate ratio in comparison with the value created in the economy. Various other indicators are used as well, depending on the specifics of an economy and the principle of optimality so as to avoid burdening the analysis with unnecessary information.

Current account

The analysis of **trade account** components is focused on the structure of exports and imports by goods groups and trade partners. The goods side of the import and export structure allows to evaluate economy's export potential by industries and monitor the structure of import demand. In the latter case, the distribution of goods by the purpose of final consumption is important.⁴ Provided that investment goods are used effectively, their larger share among imported goods refers to higher economic growth potential – and usually also greater production of exportable goods.

As regards the structure of exports and imports, attention should be paid also to the distribution of items by “normal” exports and imports⁵ and processing. According to the methodology, goods imported to Estonia and later re-exported by the outsourcing sector are shown in implicit prices on trade account of the balance of payments, although they involve no actual change of ownership or settling of accounts.

If the import-export structure of goods groups and trade partners is too one-sided or narrow, it exposes the trade balance to the volatility of domestic prices and prices of trade partners. This may entail rapid changes in the external trade structure, especially when the share of substitute goods is considerable.

The analysis of foreign trade balance is supported by several additional indicators. The most widespread indicators used in external environment analyses are as follows.

1) Economy's **degree of openness**, O , which reflects GDP's dependence on the foreign trade turnover of goods and services:

$$O = \frac{X + |M|}{GDP}$$

High degree of openness depends on the external environment and exposure to the changes there. This indicator can be successfully used in international comparison too.

The degree of openness can also be found on the basis of exports only. This indicator points to the economy's ability to create foreign exchange income, which in turn enables to service large (external) debt:

$$O_x = \frac{X}{GDP}$$

⁴ Foreign trade statistics distinguishes between capital goods, intermediate consumption goods, consumer goods and other goods.

⁵ “Normal” exports comprises goods produced in Estonia and belonging to Estonian legal persons, excluding processed goods. “Normal” imports comprises goods imported to Estonia's internal market, excluding goods imported for processing.

2) **Export price index** \bar{P}_X and **import price index** \bar{P}_M , which reflect changes in the prices of a country's export or import goods (indicators of competitiveness).

3) **Terms of trade index** TOT , which is calculated as a ratio of export and import price indices of the same base year:

$$TOT = \frac{\bar{P}_X}{\bar{P}_M}$$

This index shows the purchasing power of exports relative to imports. When import prices decline and export prices rise, the value of the index increases (and vice versa), pointing to improving (deteriorating) terms of trade.

4) The **index of the real effective exchange rate** (*REER*) of the national currency describes exchange rate changes (E) against the currencies of the main trading partners and changes in domestic consumer prices (\bar{P}) against those of these trading partners (\bar{P}_w). The weights (W) of the index are calculated on the basis of the structure of the foreign trade turnover⁶:

$$REER = \frac{E \cdot \bar{P}_w}{\bar{P}} = \left(\frac{E_1 \cdot \bar{P}_1}{\bar{P}} \right)^{W_1} \left(\frac{E_2 \cdot \bar{P}_2}{\bar{P}} \right)^{W_2} \dots \left(\frac{E_n \cdot \bar{P}_n}{\bar{P}} \right)^{W_n}$$

When REER appreciates, then domestic goods lose in competitiveness in external markets and import goods become more affordable (and vice versa).

The analysis of the **services** account generally relies on the same principles as described above in the context of external trade, as external trade is indirectly related to services (transportation services). The volume of services exports/imports has witnessed strong growth over the last decade owing to the general globalisation. Therefore, the structure of items in the standard presentation of the balance of payments was expanded substantially in 2003.

The analysis of both goods and services accounts is also illustrated by the ratio of exports to imports (X/M).

The balance of the **income account** shows the net flow of factor income (labour and capital), which is largely determined by the international investment position. Incomes are calculated on an accrual basis; the claims or liabilities that arise from the current accounting of incomes are added to the balance of debt instruments on the financial account.

The deficit on income is not considered as critical from the aspect of current account sustainability as the balance of goods and services, because the capability of an economy to service future exter-

⁶ The calculation of the REER of the Estonian kroon, published by Eesti Pank, draws from the indicators of Estonia's nine main trading partners.

nal debts primarily depends on the exports of goods and services at the current moment.

Besides the traditional ways of describing the income structure, various ratios are used by types of financial instruments and compared to GDP and investment position balances:

1) The **ratio of reinvested (net) earnings to GDP** ($\Delta Y_{RT}/GDP$) shows how much the current account balance ($\Delta CA/GDP$) would differ from the real indicator if reinvested earnings were excluded from the balance of payments.⁷

2) The **ratio of income on equity to GDP** ($\Delta Y_{OE}/SKP$) shows how much the current account balance ($\Delta CA/GDP$) would differ if dividends on direct and portfolio investment were not paid (this is necessary in the case of large current account deficits to indicate the share of the “low-risk” deficit in the current account balance).

3) **Profitability of foreign investment** (i). This indicator can be determined on the basis of any interest-bearing debt instrument, which is calculated based on the balance of that instrument in the investment position:

$$i = \frac{\sum_{i=t-4}^t \Delta Y_{K_i}}{K_t} * 100, \text{ where}$$

ΔY_{K_i} – credit (debit) value of the income on the debt instrument in the quarterly balance of payments;

t – reporting quarter;

K_t – balance of the debt instrument on the asset (liability) side of the investment position at the end of the reporting quarter t .

4) **Burden of interest expenses related to servicing external debt** (K_d):

$$K_d = \frac{\Delta Y_{DL}}{X}, \text{ where}$$

ΔY_{DL} – interests paid on loans (debit);

X – exports.

The only politically regulated income account items concern the general government. That is why these items usually deserve special attention in the case of great indebtedness.

⁷ Reinvested earnings were included in the balance of payments methodology with the introduction of the 5th version of the methodology. This indicator is especially useful in analysing and comparing the time series calculated on the basis of the previous version of the methodology.

Current and capital transfers accounts are not that important from analytical perspective because their percentages in the total turnover of the balance of payments are usually not that high and do not depend on external factors.

Countries, where the balance of payments depends on international transitional support, foreign aid and state donations, also use the **ratio of government transfers to GDP** ($\Delta TR_G/GDP$) as an additional indicator. This shows how much the real gap of domestic demand and incomes differs from the “official” current account balance. The proportion of foreign aid in Estonia’s balance of payments has been modest, and has now been replaced by transfers from EU structural funds. Therefore, this indicator is quite revealing.

Financial account, investment position and external debt

The statistical analysis of financial transactions and the investment position proceeds from their role in funding the current account of the balance of payments and is usually limited to pointing out the general developments in the structure of capital flows. The most important aspects of funding are related to the extent, share and nature of the inflow and outflow of short- and long-term capital from the perspective of debt creation. These are the factors to be related to the main overall indicators that can be calculated through the balance of payments flows or investment position stock variables:

1) Share of short-term capital in financing:

$FA_{SR}/\Delta FA$, where ΔFA_{SR} is the short-term financial flow on the financial account;

EA_{SR}/EA , where EA_{SR} is the balance of short-term external assets and EA is the total balance of external assets;

EL_{SR}/EL , where EL_{SR} is the balance of short-term external liabilities and EL is the total balance of external liabilities;

$NIIP_{SR}/NIIP$, where $NIIP_{SR}$ is the short-term net investment position.

2) Share of debt capital in financing:

$\Delta FA_D/\Delta FA$, where FA_D is the short-term debt capital flow on the financial account;

EA_D/EA , where EA_D is the balance of short-term debt assets and EA is the total balance of external assets;

EL_D/EL , where EL_D is the balance of short-term liabilities and EL is the total balance of external liabilities;

$NIIP_D/NIIP$, where $NIIP_D$ is the net investment position repayable.

If necessary, debt indicators may be indicated also by economic sectors (e.g. the general government separately in the case of large general government deficit) and as a ratio of GDP.

Direct investment is one of the main forms of international capital movement owing to global economic growth, technological developments, international competition and liberalisation.

The specifics of direct investment lies in the fact that capital flows are accompanied by full or partial control over the subsidiary or affiliated company through which indirect influence is exerted on the total output and employment of the destination country. The determinants accompanying direct investment include, among other things, the transfer of technologies and know-how as well as growth in foreign trade and competition.

Consequently, the analysis of direct investment should cover the countries of origin and destination of investment as well as the primary fields of activity receiving the investment. With the necessary data available, a more in-depth analysis can be carried out in order to monitor the impact of direct investment companies on import and export indicators.

The analysis of direct investment relies on the following ratios:

1) **Share of debt capital in direct investment** (FDI_d/FDI), which shows the foreign investor's preferences as to the form of capital and can be calculated on the basis of both flow and stock variables. The main components of direct investment (equity capital and reinvested earnings) are non-debt creating, since no contractual liabilities occur. Then again, direct investors might also prefer loan capital. Changes in the structure of the direct investment capital refer to changes in the investor's risk sensitivity as well as to the company's over- or undercapitalisation.

2) **Direct investment per capita** ($FDI/population$) is widely used in international comparisons. Therefore, the analysis of Estonia's balance of payments should take that into account as well.

As mentioned above, the importance of **reserves** in balance of payments financing depends on the exchange rate regime used. Moreover, the internationally recognised economic indicators that are related to reserves need to be interpreted accordingly.

The adequacy of reserves demonstrates whether a central bank has sufficient external assets for the indirect financing of potential future balance of payments transactions:

1) **Coverage of imports by reserves** ($A_{IR(M)}$) measures the volume of reserves necessary for the full financing of goods and services imports from the foreign exchange reserves (the exchange rate is maintained):

$$A_{IR(M)} = \frac{IR}{M/3}, \text{ where}$$

IR – balance of reserves as at end of period;

M – imports of goods and services in a quarter;

Since processing is not financed, the respective item must first be excluded from imports.

2) Similar to the previous indicator, the **coverage of short-term capital outflow by reserves** ($A_{IR(STC)}$) measures the sufficiency of reserves necessary for meeting the foreign currency demand related to the possible outflow of short-term capital (in the case of the currency board arrangement) or for the interventions carried out in order to maintain the exchange rate (in the case of the floating interest rate system):

$$A_{IR(STC)} = \frac{IR}{PI + D + OI_s}, \text{ where}$$

PI – balance of portfolio investment liabilities;

D – balance of derivatives liabilities;

OI_s – other investment liabilities: balance of short-term capital.

One of the possible criteria suggested for forecasting reserves related currency crises is the ratio of reserves to the supply of monetary base (IR/M_o). Since the automatic functioning of the currency board system guarantees full coverage of the monetary base, there is no need to monitor this indicator in Estonia.

EVALUATING THE SUSTAINABILITY OF THE CURRENT ACCOUNT AND EXTERNAL DEBT

The key issue for countries with large current account deficits is the long-term sustainability of the deficit and the timely introduction of offsetting economic policy measures.

There is no general rule for determining the sustainability of the current account deficit. The intertemporal budget constraint, as known from economic theory, sets only theoretical constraints to the growth of current account deficit and debt. If a country's net external debt at the time under review is equal to the sum of discounted current account balances of the future periods at that time, then the current account deficit is sustainable. Thus, the current account deficit may be rather large at some point if it will turn into a surplus in later periods.

Statistically, it is not possible to determine the discounted value of future current accounts. Therefore, it is necessary to identify more exact indicators that describe the nature of debt and capability of repayment. Several such indicators have been suggested in different studies on financial crises, though they have not always proved successful in the prevention of problems.

Sustainability ratios

The following ratios proceed from the level of detail of Estonia's balance of payments. They serve as a basis for the evaluation of the risks associated with the current account deficit.

The latest developments of current account sustainability are reflected in changes in the **share of non-debt capital** (CA_S) in the financing of current transfers:

$$CA_S = \frac{\Delta CA}{\Delta FDI_{ND} + \Delta PI_{ND}}, \text{ where}$$

ΔCA – current account balance;

ΔFDI_{ND} – direct investment: equity capital, (net) reinvested earnings;

ΔPI_{ND} – portfolio investment: (net) equity securities.

A similar ratio, $NIIIP_S$, which is calculated on the basis of stock variables shows the current situation in general:

$$NIIIP_S = \frac{NIIIP}{FDI_{ND} + PI_{ND}}, \text{ where}$$

$NIIIP$ – net investment position (cumulative current account);

FDI_{ND} – direct investment: equity capital, (net) reinvested earnings in (net) investment position;

ΔPI_{ND} – portfolio investment: equity securities in (net) investment position.

In the long run, economic growth is considered to be the most efficient resource for the repayment of debt resulting from the current account deficit. Thus, the most general debt indicator would be the **ratio of debt to GDP** (the direct resource base) and the related changes (D/GDP).

As economic growth depends on investment, also the **ratio of imports of investment goods to current account** ($M/\Delta CA$) provides useful information.

If the debt-to-GDP ratio is low but the debt needs to be repaid during the following period, problems of liquidity might occur. This is illustrated by the increase in the **ratio of short-term debt to total debt**, which performs as a risk indicator (D_g/D).

Yet another possibility to determine the sustainability of debt (i.e. also the current account) is to compare the **balance of debt** with the (currency) income on goods and services exports (D/X).

CONCLUSION

The above list of analysis techniques is far from being complete. Nevertheless, the techniques described help to discover new aspects in the analysis and interpretation of balance of payments statistics. Most of these indicators provide more and more useful information over time and in comparison with the balance of payments statistics of other countries.

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