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Long Run and Short Run Saving-Investment Relationship in India

Bichitrananda Seth¹

Abstract

The present study examines short and long run relationship between gross domestic savings and investment as well as corporate sector savings and corporate sector investment in India using Engel Granger cointegration test. Also attempt is made to find out the rate of adjustment in the disequilibrium being corrected in the short run by applying Engel-Granger Error Correction Model. The result indicates long run relationship between domestic saving and investment on the one hand and between corporate savings and corporate investment on the other hand. The former reveals low foreign capital mobility into India whereas the later presents a picture of corporate sector's dependency on their internal fund for investment. In the short run, change in domestic savings and corporate savings effects domestic investment and corporate investment respectively. Since, variables are co-integrated, any deviation from equilibrium in a period is getting corrected within two years. The implication of the above results are that - the lower degree of capital mobility, corporate sector's reliance on its own fund and slower adjustment of disequilibrium in corporate investment might result in distortion in the economy when the corporate sector's net profit would be affected due to some internal or external factors. There is a need for strengthening the financial system so as to make the banks more effective for channelizing household savings to increase capital formation.

JEL Classification: E21, E22.

Key Words: Savings, Investment.

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Introduction

Martin Feldstein and Charles Horioka, in their paper published in 1980, raised three important questions relating to how the world's supply of capital is internationally mobile:

Does capital flow among industrial countries to equalise the yield to investors? Alternatively, does the saving that originates in a country remain to be invested there? Or does the truth lie somewhere between these two extremes?

Their empirical research to answer these questions gave a puzzling result that domestic savings and investment within a country are highly correlated to each other. This was contrary to the conventional wisdom. Firstly, in most of the theoretical, open economy models, perfect capital mobility was assumed; secondly, it appeared that financial integration in the industrialized world was high and increasing, particularly since the introduction of floating exchange rates in the early 1970s. Feldstein and Horioka argued that, under perfect capital mobility, the association between domestic savings and investment is negligible or non-existence since savings can move out of the domestic market for higher return from the global market. This implies that the increment in investment in a particular country can be financed by global funds. By contrast, the savings-investment relationship comes out to be strong for zero capital mobility since saving has to be invested domestically. In cross section regressions for 16 OECD countries for the 1960-74 periods, Feldstein and Horioka (FH) failed to reject the null hypothesis of a one-to-one association between savings and investment. They interpreted this as implying zero capital mobility.

Thereafter, a number of both theoretical and empirical contributions continued to offer support for the FH approach. Iorio and Fachin (2010) examined a panel of 18 OECD economies for a period from 1970 to 2007 both individually and as a panel. They found a long-run saving-investment relationship for half of the OECD economies (Portugal, Japan, United Kingdom, Australia, United States, Italy, Denmark, Netherlands, Canada and Sweden), but not in the other half (Spain, Belgium, France, Ireland, Finland, Germany and Austria). Sinha and Sinha (1998) tested the FH hypothesis of savings and investment equality using the cointegration methodology for ten Latin America countries (Colombia, Dominican Republic,

Ecuador, El Salvador, Guatemala, Honduras, Jamaica, Mexico, Panama and Venezuela). The result shows that savings and investment ratios have a long-run relationship for only four countries.

The hypothesis was also tested to examine the long run relationship in India. Singh (2008) has examined the long-run relationship between domestic savings and investment in India. He found cointegration between these two variables. The long run slope parameter on saving is significantly different from zero but not from one. This result supports the FH hypothesis and suggests the imperfect mobility of capital and home-bias in the asset portfolio of domestic investors. Verma (2007) studied the relationship of savings, investment and economic growth in India using the autoregressive distributed lag (ARDL) approach to cointegration using data from 1950-51 to 2003-04. The F-static indicated that the null of no cointegration cannot be rejected only when GDP is the dependent variable. Venkata (2005) found that savings are influencing investment but investment is not influencing the savings in India. The savings are influencing the investment by 95 per cent whereas investment is influencing savings by 5 per cent. The growth in savings could not finance most of India's investment especially in mid-1980s because they were already at a quite high level. As a result, during the late 1980s India depended heavily on foreign sources that led to a balance of payment crisis in 1990's. Khundrakpam and Ranjan (2010) found long-run co-integration relationship between savings and investment. However, inclusion of post reform period weakened the relationship characterised by a more liberalised period. On the other hand, Wahid et al (2008) found that there exists low positive correlation between domestic savings and investment in Bangladesh, Pakistan, India, Nepal and Sri Lanka.

Thus, the method proposed by FH to measure the degree of capital mobility has been widely used by economists and other researchers around the world. Though in Indian case, the result already found was low foreign capital mobility into India, in this paper attempt has been made to see the equilibrium adjustment of investment in the long run. Additionally, the relationship between private corporate sector savings and private corporate investment is also examined to find out the degree of reliance of private corporate sector on their own internal fund, along with equilibrium adjustment in the private corporate investment. This will give an idea about the financing problem of the corporate sector.

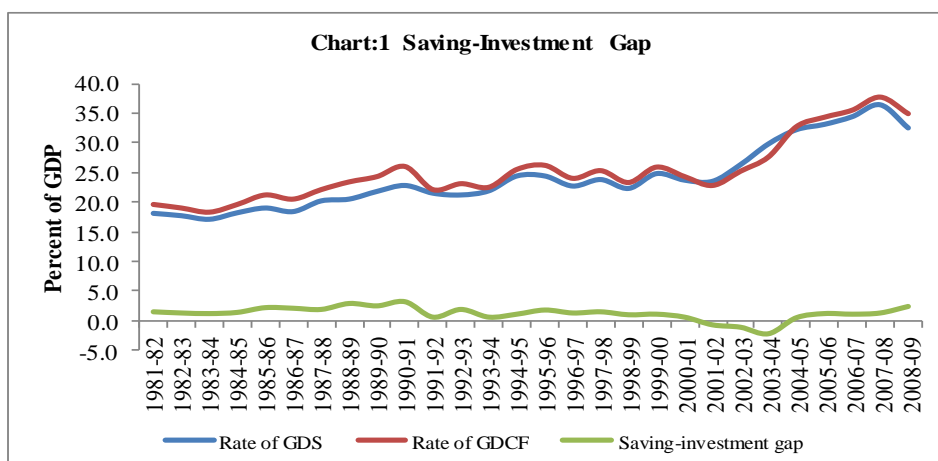
This paper is organized as follow: section I gives an overview of savings, investment and capital flows into India. Section II provides empirical results. The conclusions are presented in Section III.

Section I

Savings and Investment in India

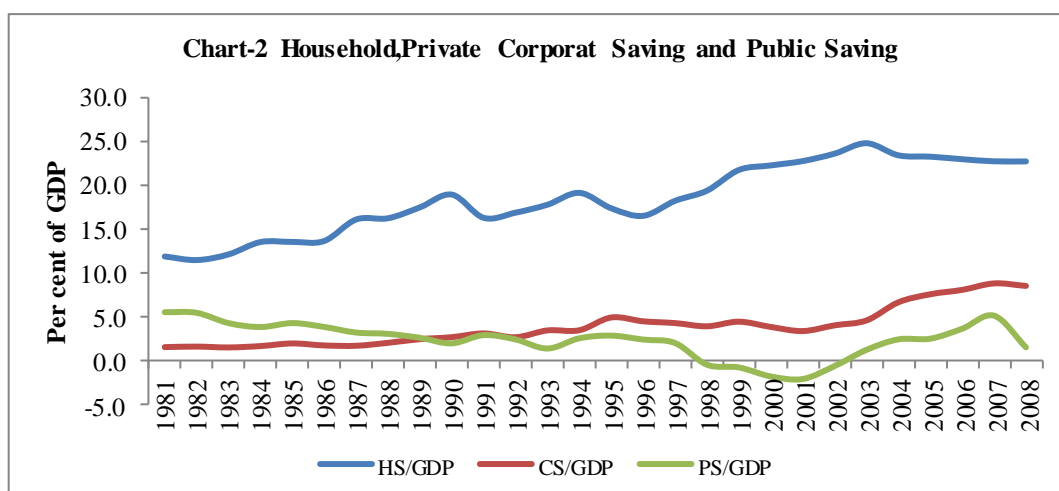
Savings are the backbone of investment *viz.*, higher savings lead to higher investment and to higher growth in an economy provided that the other macroeconomic variables are conducive and a developed financial system exists. India has different forms of savings of which household savings generally constitute the largest share in aggregate domestic savings. The household savings is further categorized as financial and physical savings. Other forms of savings comprise savings by the private corporate sector, the public sector and foreign savings as measured by the magnitude of the current account balance. Generally, the current account balance is considered as foreign savings in the national accounts identity. The gross investment is also divided into household, corporate and public sector investment.

In India, the gross domestic investment rate increased to 24.3 per cent in 2000-01 from 19.6 per cent in 1981-82. During the same period, the gross domestic savings rate increased to 23.7 per cent from 18.1 per cent. The rate of gross domestic capital formation (GDCF) remained above the rate of gross domestic savings (GDS) necessitating foreign capital equal to the amount of saving-investment gap (Chart-1).



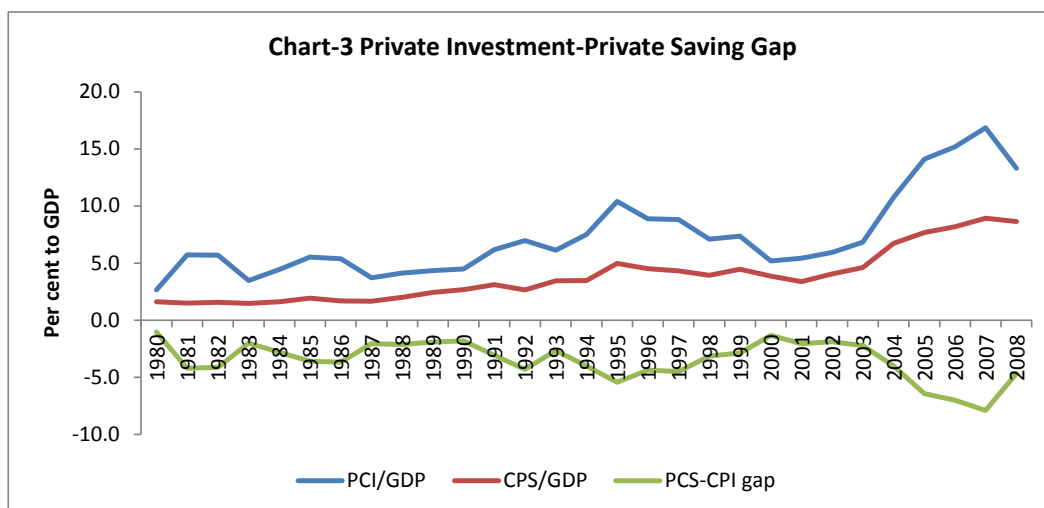
During 2001-02 to 2003-04, the domestic savings remained above the gross investment due to current account surplus achieved in Balance of Payment (BoP). Thereafter, domestic investment always exceeds the domestic savings. The gross domestic investment rate increased to 34.8 per cent in 2008-09 from 22.8 per cent in 2001-02. This was primarily on account of high growth and economically conducive environment. The gross domestic savings rate also increased to 32.5 per cent in 2008-09 from 23.5 per cent in 2001-02. This increase in savings along with huge capital inflows had supported the investment growth.

At the dis-aggregated level, household savings and private corporate savings have shown a steady upward increment (Chart-2). Public sector savings declined slowly and turned to negative in 1998 on account of incurring higher fiscal deficit. After, introduction of Fiscal Responsibility and Budget Management Act (FRBM) Act,



public sector savings started rising upward. In 2008-09, private corporate and public sector savings declined due to the effect of financial crisis while household sector savings remained the same.

The private savings has increased from 2.7 per cent of GDP in 1980 to 5.2 per cent in 2000-01 and further to 16.9 per cent in 2007. The investment is mainly financed by its own sources as well as household savings and foreign savings. However, during the entire period, the corporate savings remained lower than the corporate investment (Chart-3).



Since the corporate investment has been increasing over the years, the role of savings is crucial. Adequate savings is required to step up the corporate investment which in turn increases economic growth.

Foreign Capital Flows into India

Though the capital account of the BoP is not separately represented in the national income identity, it may have a significant role in explaining capital formation. It is a useful yardstick to measure the contribution of capital flows to domestic capital formation as it comprises flows such as external commercial borrowings, foreign direct investments and forms of external assistance that may generally be earmarked for specific capital expenditure purposes. On the other hand, while NRI deposits and portfolio flows may not directly contribute to capital formation, they may have indirect effect on domestic capital accumulation rate owing to improvement in market liquidity and sentiments, and by serving to equilibrate the receipt–expenditure imbalance in the current account. According to the findings of Joshi (2007):

As the long-run steady state relationship between capital formation and various components of savings and the capital account balance has remained stable in India, the role of capital account in maintaining the momentum of capital acquisition by restoring the balance between savings and capital investment has been notably significant. In fact, the capital account has played an important role as an equilibrating mechanism by addressing short-term disturbances in the steady state equilibrium thereby avoiding sudden disruptions in the process of capital formation cycles. By this token, it may not be incorrect to state that capital flows have the potential to influence growth positively both in the short and the long-term by helping to maintain the aggregate balance between savings and investment and providing support for long term capital formation. Needless to mention in terms of the long-term impact, both public and

private savings are also crucial for sustaining capital formation as they have highly positive long term impact on capital formation.

Starting at the time of independence and spanning up to the early 1980s, India's reliance on external flows was mainly restricted to multilateral and bilateral concessional finance. Subsequently, however, in the context of a widening current account deficit during the 1980s, India supplemented this traditional external source of financing with recourse to external commercial loans, including short-term borrowings and deposits from non-resident Indians (NRIs).

Reform process was initiated after the balance of payment crisis in 1991. It included a swift transition to a market-determined exchange rate regime, dismantling of trade restrictions, a move towards current account convertibility and a gradual opening-up of the capital account. With the progressive opening-up since the early 1990s, the capital account in India today can be considered as the most liberalised it has ever been since the late 1950s. During 2001-02 to 2003-04, the domestic savings remained above the gross investment due to current account surplus accrued in BoP. Thereafter, domestic investment always exceeds the domestic savings. This increase in savings along with huge capital inflows had supported the investment growth. Net capital inflows increased from 2.2 per cent of GDP in 1990-91 to around 9.0 per cent in 2007-08. India has cautiously opened up its capital account since the early 1990s as policymakers realised that to meet the country's huge investment demand domestic savings needed to be supplemented with foreign savings.

Thus, India's high GDP growth was accompanied by higher rate of savings and investment. Capital inflows also helped in bridging the gap between savings and investment.

SECTION II

Empirical Findings

The objective of this paper is to analyze the long run and short run relationship between gross savings and gross investment on the one hand and corporate sector savings and corporate sector investment on the other hand. The time series are annual data and the sample period is from 1980 to 2008. All the

variables are extracted from 'Handbook of Statistic on Indian Economy' published by Reserve Bank of India (RBI). The data are in current prices and all are divided by nominal GDP at market prices. To investigate the long run relationship, Engel-Granger cointegration test (1987) is applied in the both cases, whereas Engel-Granger Error Correction Model (1987) is used to examine the short run relationship as well as equilibrium adjustment. Before the methods are used, the stationarity of all the variables such as gross investment-GDP ratio (GI), Gross savings-GDP ratio (GS), Corporate Investment-GDP ratio (CI) and corporate savings-GDP ratio (CS) are tested. Three types of methods i.e. Augmented Dicky-Fuller test (ADF, 1981), Philip-Perron test (PP, 1988) and Kwiatkowski-Phillip-Schmidt-Shin test (KPSS, 1992) are used to find out whether the time series are stationary or not. The results are given in the following table:

Table-1: Unit-Root Test of Domestic Savings, Domestic Investment, Corporate Savings and Corporate Investment

Tests	Test Statistics	Level, I(0)	First Difference, I(1)	Level, I(0)	First Difference, I(1)	Level, I(0)	First Difference, I(1)	Level, I(0)	First Difference, I(1)
		Domestic Investment		Domestic Saving		Corporate Investment		Corporate saving	
ADF Test	t-stat.	-0.7652	-6.7588*	-0.3275	-4.5528*	-1.0827	-4.1045*	0.6248	-4.4780*
PP Test	Adj t-static	-0.7652	-6.7587*	-0.3145	-4.5399*	-1.2245	-4.1272*	0.4447	-4.5247*
KPSS Test	LM test	0.5546**	0.1565	0.6194**	0.1134	0.5212**	0.0661	0.6239**	0.2616

*Significant at 1per cent level

** Significant at 5 per cent level reflecting acceptance of null hypothesis of stationary series

The above table suggests that all the variables are non-stationary in level but stationary in first difference i.e. first order integrated, I (1). Since the variables are in the same order and two variables at a time are going to be examined, Engel Granger cointegration test can be applied to inspect the long run and short run relationship between them. The long run relationship as well as short run relationship is given in the next sub-section.

Gross Domestic Savings (GS) and Gross Domestic Investment (GI)

To examine the long run relationship between gross savings-GDP ratio and gross investment-GDP ratio, the Engel-Granger (EG) cointegration test is used. For the EG cointegration test, the following two steps are followed:

(i) A linear combination of GS and GI can be directly taken from estimating the following regression using OLS Method:

$$GI_t = \beta_1 + \beta_2 GS_t + \varepsilon_t \dots\dots\dots (1)$$

Where,

GI= gross investment - GDP ratio

GS= gross saving-GDP ratio

ε =error term

The OLS result is given below:

$$GI = 0.0501 + 0.8442 GS \dots\dots\dots (2)$$

(3.4610) (14.1649)

$R^2 = 0.88$ $d = 1.2$

Granger and Newbold (1974) have suggested that an $R^2 > d$ is a good rule of thumb to suspect the estimated regression as spurious one. The result stated in equation (2) is not spurious since $R^2 < d$.

(ii) Taking the residual from equation (1), we get

$$\varepsilon_t = GI_t - \beta_1 - \beta_2 GS_t \dots\dots\dots(3)$$

Then stationarity of the residual is checked by using Augmented Dicky-Fuller (ADF) unit root test. If the residual is I (0), then the GI and GS are said to be cointegrated. The results of each test are given below:

Table-2: Unit Root Test of Residual

Tests	Statistic	Residual
ADF test	t-statistic	-3.3167**

** Significant at 5 per cent level reflecting rejection of null hypothesis.

The above test indicates that the residual is stationary in level. Hence, the two series are cointegrated. A long run relationship exists between the domestic savings and domestic investment in India. Since the coefficient of savings is close to one (0.84), according to Feldstien-Heroic hypothesis, it can be inferred that the degree of capital mobility is low into India. One important policy implication of this result is that the policies which effect gross savings will also affect gross investment in India.

Going further, attempt is made to examine the behavior of these two variables in the short run and speed of adjustment it takes to come back to the steady state

path. To inspect the short run impact of domestic savings on domestic investment and the rate of adjustment required to reach to the equilibrium, the Engel-Granger Error Correction Model in the following form is used,

$$\Delta GI = a_1 + b_1 \Delta GS + b_2 EC_{t-1} + \mu_t \dots \dots \dots (4)$$

Where,

ΔGI = first difference of Gross Domestic Investment ratio;

ΔGS = first difference of Gross Domestic Savings ratio;

EC_{t-1} = residual found in the equation (2);

μ_t = random disturbance term

Here, b_1 is the impact multiplier (short run effect) that measures the immediate impact that a change in GS will have on a change in GI. On the other hand b_2 is the feedback effect or the adjustment effect and shows how much of the disequilibrium is being corrected in a particular period. In the above equation the change in GI and GS is stationary because they are assumed to be I (1) variables and the residual from the levels regression is also stationary by the assumption of cointegration. So if OLS is applied on the above equation, it performs well. The result is given below:

$$\begin{aligned} \Delta GI = & 0.0022 + 0.6063 \Delta GS - 0.6882 EC_{t-1} \dots \dots \dots (5) \\ & (0.7394) \quad (3.2298) \quad (-3.5793) \\ & R^2 = 0.57 \quad d = 1.7 \end{aligned}$$

The above result shows that there is short run effect of domestic savings on domestic investment i.e. a unit change in additional saving leads to half unit change in increased investment. Speed of adjustment term has also negative sign and it is statistically significant which shows the convergence of our model towards long run equilibrium. Coefficient -0.6882 shows that about 69 per cent adjustment takes place each year towards long run equilibrium.

Private Corporate Savings (PCS) and Private Corporate Investment (PCI)

The short run and long run behavior of gross domestic investment can be compared with the behavior of corporate investment in India (though the latter is a part of former) taking the same period in consideration. The need for this comparison is that over the years, private corporate investment has been showing a rising trend, particularly after the economic reform in 1991. It is expected that as private corporate has been showing good performance, both investment and savings might have

increased over the years. So a long run relationship is expected to exist. Furthermore, any shock to the corporate savings may be leading to affect the corporate investment in the short run. Also, the deviation from equilibrium may be getting corrected in each period.

The table-1 shows that the corporate investment and corporate savings are non-stationary in level but stationary in first difference. Since the variables are of same order, the Engel-Granger cointegration test can be applied to find out the long run relation. To generate residual series, the OLS regression is run for private corporate investment on private corporate savings. It can be of the following form:

$$PCI_t = \beta_{11} + \beta_{22} PCS_t + \varepsilon_t \dots\dots\dots (6)$$

Where,

PCI = private corporate investment to GDP ratio;

PCS = private corporate saving to GDP ratio;

ε = random disturbance term

The result is shown below:

$$PCI = 0.0149 + 1.5227 PCS \dots\dots\dots (7)$$

(2.3001) (14.7520)

$R^2 = 0.88$ $d = 1.2$

The result stated in equation (7) is not spurious since $R^2 < d$.

The generated residual, thereafter, tested for stationarity. The test result is given below:

Table-3: Unit-Root Test of Residual

Tests	Test statistics	Level
ADF test	t-stat	-3.3456**

** Significant at 5 per cent level reflecting rejection of null hypothesis.

The above unit root test for residual gives indication of stationarity in level which implies that a long run relationship exists between private corporate investment and private corporate savings. The coefficient of private corporate savings is more than one which suggests a high level of reliance on their own retained earnings for their investment.

To find out the short run impact of corporate savings on corporate investment and the rate of adjustment required to reach to the equilibrium, the Engel-Granger Error Correction Model in the following form is used.

$$\Delta PCI = a_{11} + b_{12}\Delta PCS + b_{22}EC_{t-1} + \mu_t \dots \dots \dots (8)$$

Where,

ΔPCI = first difference of Private Corporate Investment

ΔPCS = first difference of Private Corporate Savings;

EC_{t-1} = residual found in the last regression;

μ = random disturbance term

The result is given below:

$$\begin{aligned} \Delta PCI = & 0.0002 + 1.6889\Delta PCS - 0.5860 EC_{t-1} \dots \dots \dots (9) \\ & (0.0658) \quad (4.6468) \quad (-3.1285) \\ & R^2 = 0.61 \quad d = 1.5 \end{aligned}$$

The above result shows that there is short run effect of private corporate saving on private corporate investment i.e. a unit change in additional PCS leads to more than one unit change in increased investment. Speed of adjustment term has also negative sign and it is statistically significant that shows the convergence of our model towards long run equilibrium in case of any disturbance occurs in the short run. Coefficient -0.5860 shows that about 59 per cent adjustment is taken place each year towards long run equilibrium.

SECTION III

Conclusions

This paper has examined the long-run and short-run relationship between domestic savings and investment on the one hand and between private corporate savings and private corporate investment on the other hand. Also, it focused on their rate of adjustment in disequilibrium in the long-run. The following are the main conclusions:

- The gross domestic savings and investment are cointegrated and the coefficient of saving is close to one. This indicates that the degree of capital mobility into India is very low i.e. domestic investment is mostly financed by

domestic savings. In the short run, change in domestic savings effects domestic investment. Since, variables are co-integrated, any deviation from equilibrium in a period is getting corrected by 69 per cent in the next year.

- The corporate savings and corporate investment are also cointegrated and the coefficient is more than one denoting that corporate sector is more dependent on their own fund. They generally generate their savings from the retained earnings. So, any downward disturbance appearing in retained earnings will reduce their savings and investment in the short run. However, 59 per cent of the disequilibrium gets corrected in the next period and ultimately reach equilibrium.
- The lower degree of capital mobility, corporate sector's reliance on its own fund and slower adjustment of disequilibrium in corporate investment might result in distortion in the economy when the corporate sector's net profit would be affected due to some reasons.
- There is a need for strengthening the financial system in order to effectively channelize household savings for enhancement of capital formation.

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