

Dynamics of Foreign Direct Investments in Bulgaria for the Period 1999 - 2011

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Summary:

The paper presents some of the main results of studying the dynamics of the net foreign direct investment (FDI) flows in Bulgaria by quarter on quarter for the period between 1999 and 2011. The analysis of the dynamics is limited to exploring the trend and seasonality in its dynamics. Based on ARIMA models, a forecast by quarters for 2012 have been estimated.

Keywords: foreign direct investment, trend, seasonality, forecasting, Bulgaria.

JEL: F21, F23, C53

1. Introduction

Foreign investments are one of the essential indicators for the state and the development of any economy. Globalisation is among the main factors stimulating foreign investments in different economies and the resultant increase in interest in them over the past decades. Marinov states that "the dynamic development of FDI has been a specific characteristic of the world economy over the past half century" (Marinov, 2008,

p 52). Global foreign direct investments (FDI in the whole world) increased by 20% in the period between 1990 and 1999, but in the following decade (2000 – 2009) they grew by merely 3%. What is more, the world economic crisis led to a slump of 37% in investments in 2009 compared to 2008 and the uncertain the economic environment is expected to be the main obstacle to investments in the next few years (Kearny, 2011, p.44). The lack of uniformity in the development of investments further motivates the research of their dynamics and the need for both short and medium-term forecasts.

There is considerable interest in foreign investments in Bulgaria as well. As early as the start and the middle of the 1990ies of the 20th century, which was a period of transition to market economy, the investment activity in the country became a subject of studies and analysis. As Goev (2010, p.78) points out a "significant increase in foreign investments in our country was recorded in the years prior to Bulgaria's integration in the European Union", the years after the stabilization of the market environment in Bulgaria and the introduction of the Currency Board. In 1996 the total amount of FDI in the country amounted to € 137.3¹ M,

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¹ Source – Bulgarian National Bank (<http://www.bnb.bg/Statistics/index.htm>), incl financial enterprises.

whereas in 2000 this amount increased to € 1, 130.3 M. Furthermore, in the following four years the FDI amount almost tripled and in 2005 it reached € 3,16 billion. In 2007, right after Bulgaria's accession to the EU, the net FDI flows reached their highest levels for the entire period under consideration (1999-2011) and stood at € 9,051.9 M. In this respect, the main direction of the research of FDI in Bulgaria is related to the role and impact of FDI on the country's economic development. This is understandable, as far as FDI play the role of one of the most important factors for economic recovery of the Bulgarian economy during the market transition (Goev et al., 2011, p.388). According to Popov (2008, p. 56-57), the tendency toward stronger investors' interest in the middle of the past decade was due to Bulgaria's high investment rating in that period, the country's accession to the EU and NATO, the liberal legislative and regulatory regime on FDI, the attractive tax and fiscal policies, as well as the country's favourable geographic position.

Furthermore, after the 2008 world crisis the FDI flows into Bulgaria dramatically decreased. In 2007 the net flows amounted to € 9,051.9 M and dropped to € 6,727 M in 2008, while in 2010 they stood at only € 1,208.4 M. All this indicates that the study of the dynamics of FDI in Bulgaria is of crucial importance, especially in terms of its impact on the balance of payments and overall economic growth.

As mentioned above, there has been a high interest in the FDI topics in the Bulgarian economic research literature. The main part of the studies is focused on the theoretical concepts about the FDI flows and especially their implementation

in the Bulgarian economic and social conditions (Stoykov 2005; Grigorova 2007; Marinov 2008; Christova-Balkanska 2009; etc). Also, during the past decade only few studies on FDI, based on survey data analyses, have been published (Minchev et al. 2002, Mladenova et al. 2005, Tsanov 2006, Bitzenis 2007, Goev 2010, Goev et al. 2011). At the same time, insufficient analyses are available regarding FDI issues which utilize official statistical data, and particularly empirical analyses of the dynamics of FDI. Hence, the aim of this paper is to examine the dynamics of the net FDI flows by quarters for the period between 1999 and 2011, as well as to provide estimate in a horizon of four quarters in 2012. Even though there have been comparable data about the net flows of investments in the country since 1996, the choice of 1999 as the starting year in the studied period is not arbitrary. The years prior to 1999 are characterized by an unstable economic environment and high inflation. Therefore the objective economic conditions cannot be considered as comparable before and after that year.

2. Sources of Statistical Information

The starting point in studying the dynamics of FDI in our country defines the subject of the study. It is known that the subject of every statistical research is some statistical population. Giving a clear and precise definition of the statistical population and its units provides the basis for defining the methods of and approaches to the study of statistical data (Stoykova-Kanalieva, 2007, p.40). According to

the definitions used in the standards of the International Monetary Fund, the Organisation for Economic Cooperation and Development, Eurostat and the European Central Bank (Balance of Payment Manual, IMF, 5th edition, 1993, Benchmark Definitions of Foreign Direct Investments, OECD, 3rd edition, 1996) "*foreign direct investment in the country is an international investment where the direct investor, resident of a foreign economy obtains a lasting interest in an enterprise-resident of the Bulgarian economy (direct investment enterprise)*". The existence of long-term interest involves both long-term relationships between the investor and the enterprise-resident and an opportunity for exerting influence on the part of the investor in the management of the enterprise. The influence criterion is based on the principle that the acquisition of 10% or more of the voting power in the management of the investment enterprise is seen as establishing a relation between a direct investor and a direct investment enterprise. This criterion guarantees the comparability of data worldwide. The FDI comprises both the initial transaction and all the subsequent transactions between the investor and the enterprise-resident. These can be a two-way transaction. The foreign direct investments are recorded on the basis of the actual sums of money at market prices. (Balance of Payments Guidelines – BNB)

The issue about the sources of information is of crucial importance to any statistical research. The study of the dynamics of FDI is related to the use of comparable and compatible data about

investments in our country. So far there have been two institutions in our country that collect, analyze and disseminate that data – the National Statistical Institute (NSI) and the Bulgarian National Bank (BNB). The NSI collects information and analyzes data about companies in the non-financial sector, while the BNB encompasses all the sectors of the economy. The considerable share of the FDI in the financial sector of the Bulgarian economy during the studied period is the reason why this analysis uses the data provided by BNB only. In accordance with the standard presentation of the balance of payments, FDI is reported in the Financial Account, whereas the income from FDI – in the Current Account of the balance of payments. The main components of FDI encompass equity capital, reinvested earnings, and other capital. FDI-generated income is comprised of income on equity capital (dividends and reinvested earnings) and income on debt (interest on inter-company loans) (see Boshnakov, 2010). BNB publishes data about FDI in two dimensions – net FDI flows and accumulated FDI amount (stock). Thus, the subject of the current study can be defined as the flow of the FDI in Bulgaria, and in particular, the quarterly time series of the net FDI flows.

BNB studies FDI in terms of the following aspects:

- size;
- type of investment (equity capital, other capital and reinvested earnings);
- economic activities (sectors);
- geographical region.

The data is published on a monthly,

quarterly and yearly basis. Quarterly and yearly data are published on total basis by type of investment, industry and geographical region. By type of investment, data about the net FDI flows has been published quarterly and yearly since 1996, whereas by economic activities and by geographical region – only since the first quarter of 1998. BNB has reported the yearly data about the FDI stocks (accumulated amount) on total basis by type of investment and by industry since 1999. Quarterly data about the stocks have been reported total and by type of investment since 2004, whereas by industry and geographical region – since 2006.

3. Research Methodology

The research of the dynamics of FDI in Bulgaria requires constructing time series containing comparable data (Velichkova 1981, Mishev et al. 2010). The data comparability is considered under the following factors – time, place, methodology, coverage and units of measurement. Thus the yearly and quarterly data provided by BNB used in this research can be regarded as compatible. However, the following characteristic should be taken into consideration – the way of reporting both the net flows and the FDI stocks. Both indicators are presented in monetary values and are evaluated by current prices for the reported time period (quarter or year). The net flows are reported in various currencies and are converted to BGN (new Bulgarian leva) using the monthly average exchange rate of the respective currency to BGN. The stocks are converted to BGN amounts by the exchange rate at the end

of the respective period (quarter, year). In compliance with international requirements, the official data are finally reported in EUR at the fixed exchange rate of the BGN to the Euro. Thus, for the purpose of this research, the time series data are re-evaluated in constant price level in order to ensure time comparability of these monetary values.

One possible way to reevaluate the amount of net flows and the accumulated FDI funds in comparable prices is to use the GDP deflator. The NSI publishes data about the GDP yearly and quarterly at current prices and at average prices compatible to the year 2005. The comparison of these two indicators determines the GDP deflator. Later, the deflator is used to recalculate the amount of net flows and the stocks at average prices for the year 2005. Thus recalculated, the time series meet all comparability requirements and can be used for the descriptive analysis of dynamics and for forecasting the FDI in Bulgaria for the period between 1999 and 2011.

Seasonality and trend

The analysis of the FDI dynamics in this paper is limited to the study of the trend and seasonality of the net FDI flows by quarters over the period under consideration. The selection of an indicator to be used for the research of the dynamics is predetermined by its content. It is appropriate to use the net flow indicator because it genuinely reflects the changes in the economic environment and in investors' behaviour over different time spans. Since the stocks reflect all accumulated investments at the end of the studied period, they as are not sufficiently sensitive to the current minor changes in the flows.

An appropriate method to study seasonality is the seasonal decomposition based on moving averages. Since there is no reason to define the hypothesis that the amplitudes of the seasonal fluctuations are constant, the multiplicative method **for seasonal decomposition** is used. A main feature of this method is its applicability even when the amplitude of the seasonal fluctuations in the time series under consideration is not constant.

Removing the seasonal element makes possible the study of the trend. Various criteria used to check trend availability are described in the literature. One of the most popular criteria is based on autocorrelation coefficients. These coefficients are assessed for different orders and are presented graphically through the so called correlograms. Another method (especially for non linear trends) involves applying various functions for modeling and testing to assess whether if the models can adequately describe adequately the trend. If the existence of a trend is demonstrated, it can be modeled through analytical methods where the values of a time series are presented as a function of the time. The most commonly used functions are the linear and the intrinsically-linear nonlinear ones and their parameters are estimated through the Ordinary Least Square Method (OLS method). The selection of an appropriate function is based on the standard error and the determination coefficient.

The development of the net FDI flows is related to changes in the economic conditions both in Bulgaria and all over the world. In the first half of the studied period there was a favourable economic environment in Bulgaria - the country joined NATO (2004) and the European Union (2007), which are factors that boosted the net FDI. After 2008 and the start of the global economic crisis, the investment activity worldwide dropped, and the FDI flow accordingly decreased. These factors give grounds for assuming that the development of the trend will not follow only one direction and the rates of increase and decrease may vary. Therefore, in this case it would be appropriate to use polynomials of higher degree and intrinsically-linear nonlinear functions to describe the trend. The application of polynomials of higher degree has some limitations when implementing the results from the trend study for the purposes of forecasting.

Forecasting

The study of the FDI dynamics is of interest not only from the perspective of the descriptive analysis of the component development. It is important that a forecast analysis about the amount of the net FDI flows is carried out as well. If a higher degree polynomial is used to describe the lasting trend, the most appropriate forecasting method will be the one based on the ARIMA models. A one-year horizon forecast by quarters, based

on the quarterly time series between 1999 and 2011, will be produced. The uncertainty in the economic situation in both the country and across the world and the contradictory forecasts about the development of the international markets are factors which hamper producing reasonable estimates about the amount of net flows in a period that is longer than one year. The primary goal of forecasting in this case is not to predict the exact values but to outline the direction of the net FDI flows development and to estimate preliminary macroeconomic values for the balance of payment account.

4. Seasonality and trend analyses

In order to perform the time series analysis, the values of net FDI flows by quarters during the period between 1999 and 2011 has been reevaluated on the basis of comparable prices for 2005 by applying the aforementioned approach through the GDP deflator. A starting point in the study of the seasonal component of the amount of net FDI flows is drawing a chart (Fig. 1). The chart shows that the studied time series data has a clearly distinguished seasonal component and inconsistent fluctuation amplitude. This substantiates the above-stated argument that the **multiplicative method for seasonal decomposition** is appropriate for the study of seasonality. The same method has been used to evaluate the seasonal indices, as illustrated in Table 1.

Table 1. FDI Flows - Quarterly Seasonal Factor over the Period 1999-2011

QUARTER	FACTOR %
first	75.83
second	95.59
third	89.01
fourth	139.57

The seasonal indices show that there was a massive FDI flow in the fourth quarter – during that period the amount of net flows was larger by around 40% on average, compared to the average amount for a quarter throughout the studied period. The indices for the remaining three quarters are below 100%. The smallest amount was registered in the first quarter – 76%. This means that the average amount of investments for this period is by 25% lower than the average amount for a quarter for the entire studied period. These estimates of the seasonal indices are most likely attributable to the increase in the net flows in the share capital typical of the end of the fiscal year. The reevaluated values of the net flows and the ones without seasonality by quarter are shown in figure 1.

The trend in the time series of the net FDI flows is studied after the seasonal component has been eliminated. The criteria which have been used to check the availability of trend are autocorrelation coefficients. The autocorrelation coefficient of first order is of statistical significance (at $\alpha=0.01$), which proves the assumption that a development trend is observed in the studied time series of net FDI flows without seasonality.

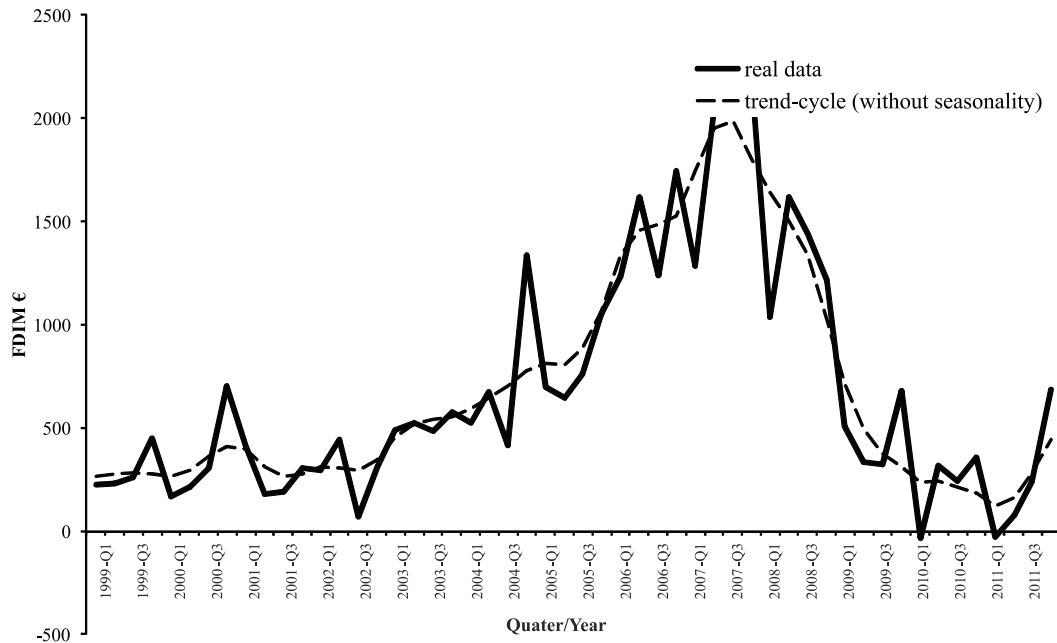


Fig.1. Foreign Direct Investments- Real Data (on comparable prices) and Trend-Cycle Component (1999-2011)

In order to model adequately the trend under the above-stated criteria (coefficient of determination), a cubic function has been chosen. This confirmed the hypothesis that when describing the trend in time series with fluctuations in development, it is appropriate to use polynomials of higher degree. The selected model has the following analytical form :

$$\hat{FDI}_{TC} = b_0 - b_1 t + b_2 t^2 - b_3 t^3 \quad (1)$$

where

\hat{FDI}_{TC} are the estimated (predicted, expected) values of trend-cycle (without seasonality) and

t is time in quarters

And the corresponding parameter estimates are:

$$\hat{FDI}_{TC} = 411.483 - 64.336t + 5.839t^2 - 0.094t^3$$

The results of the test of adequacy of the cubic model and the parameter estimation are shown in Table 2 and Table 3.

The hypotheses that the polynomial of third degree reflects objectively the development trend and that all its parameters are of statistical importance have been substantiated. The determination coefficient showed that about 66% of the variations in the time series without seasonality are due to the trend. The values of the time series

Table 2. Results of the Test of Adequacy of the Cubic Model (ANOVA method)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	9803023.790	3	3267674.597	31.562	.000
Residual	4969604.353	48	103533.424		
Total	14772628.142	51			

Table 3. Result of the Parameter Estimation of Cubic Model

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Case Sequence	-64.336	31.103	-1.812	-2.068	.044
Case Sequence ** 2	5.839	1.357	8.988	4.304	.000
Case Sequence ** 3	-.094	.017	-7.237	-5.582	.000
(Constant)	411.483	192.170		2.141	.037

without the seasonal fluctuations (trend cycle values) and the predicted values under the cubic model are presented in figure 2.

The graph showing the dynamics of the net flows illustrates that in the first two years of the studied period there is no clear trend. For the period 2001 – 2007 there is a clearly outlined trend toward growth. After the end of 2007 the net flows start to decrease and reach their lowest levels in 2010. After the first quarter of 2011 an increase in flows was observed, but this cannot be captured by the selected cubic function model (Fig.2).

The results from modeling the trend in the cases when it is described with a polynomial of larger degree are not sufficiently reliable for the purposes of forecast analysis. Furthermore, there is no reason to expect a further decrease in FDI over the future periods at rates which are typical of the period between 2009 and 2011. It is also not appropriate to use exponential smoothing since the trend is neither linear nor exponential. One possible solution is to use the ARIMA models. It is known that with this model the values from the time series are presented as a function consisting

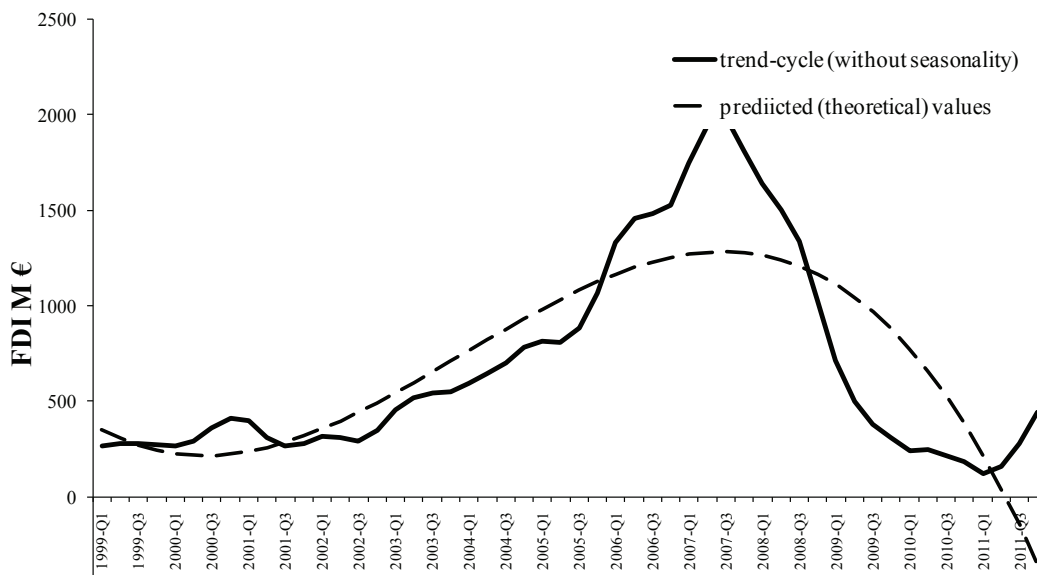


Fig. 2. Foreign Direct Investments- Trend-Cycle Component and Predicted Values under the Cubic Model (1999-2011)

Table 4. Diagnostics of Selected Models and Estimated Parameter Values

ARIMA model p, d, q	Estimated parameters	Model standard error	Akaike's Information Criterion	Schwarz's Bayesian Criterion
2, 2, 2	AR1=0,23* AR2=-0,72* MA1=-0,60* MA2=-0,99 const.=2,33	44,91	533,68	543,25

parameter is significant at level $\alpha=0,05$

of two parts – autoregressive and that of moving averages. The autoregressive part illustrates the value for the given moment or a period as a function of preceding p observations. The moving averages illustrate the weighed sums of the lagged q values of the random variable. The application of the ARIMA models to the time series of net FDI flows is related to eliminating this trend through d non seasonal differences. The practical use of these models involves defining the values of d , q and p . In this case by using specialized software (SPSS), experiments with various parameter values have been carried out and 26 models have been estimated. Using the model standard error, Akaike's Information Criterion (AIC) and Schwarz's Bayesian Criterion (BIC) one model has been chosen. The estimated

parameters of the chosen model are shown in Table 4. Based on these model this models, forecasts with four-period horizons or by quarters for 2012 have been made estimated. The forecast values are corrected for seasonality through the evaluated indices of seasonal fluctuations. The results are shown in Table 5. The forecast values are presented by comparable prices for 2005 and direct comparison with the real values published by BNB is not possible. At the end of the forecast period and after deflating the real values, the forecast error and the applicability of ARIMA models to forecast the net flows can be evaluated.

Despite the above mentioned limitations and the broad confidence intervals of the forecast, in 2012 an increasing net FDI flow is expected under the model². It is expected

Table 5. Forecast Values by Quarters for 2012

ARIMA model p, d, q	Quarter/year	Predicted values	Confidence interval	
			Lower limit	Upper limit
2, 2, 2	1'2012	434.55	364.34	504.76
	2'2012	649.69	382.83	916.55
	3'2012	718.05	225.84	1210.25
	4'2012	1338.87	148.27	2529.48

² The trend toward an increase in investments is confirmed by the Minister of Economy, Energy and Tourism D. Dobrev: 'In the first four months of the year we attracted nearly 7 times more investments in comparison with the same period of last year.' (25/06/2012 <http://www.focus-news.net/?id=n1668603>)

that the average quarter flow for 2012 based on forecast values should be around € 785 M. Figure 3 shows the net assets without seasonality and the theoretical values selected under the ARIMA models for the 1999 – 2011 period, as well as the forecast values for 2012. Only the forecast values have been corrected for seasonality.

(2005 – 2007). The impact of the world economic crisis from 2008 can be seen in the dramatic slump of the FDI flows in Bulgaria, which reached their lowest levels in 2010. The results from the short-term one-year forecast show that an increase in the net FDI flows is expected in 2012 – a trend which is confirmed by the preliminary data about investments in

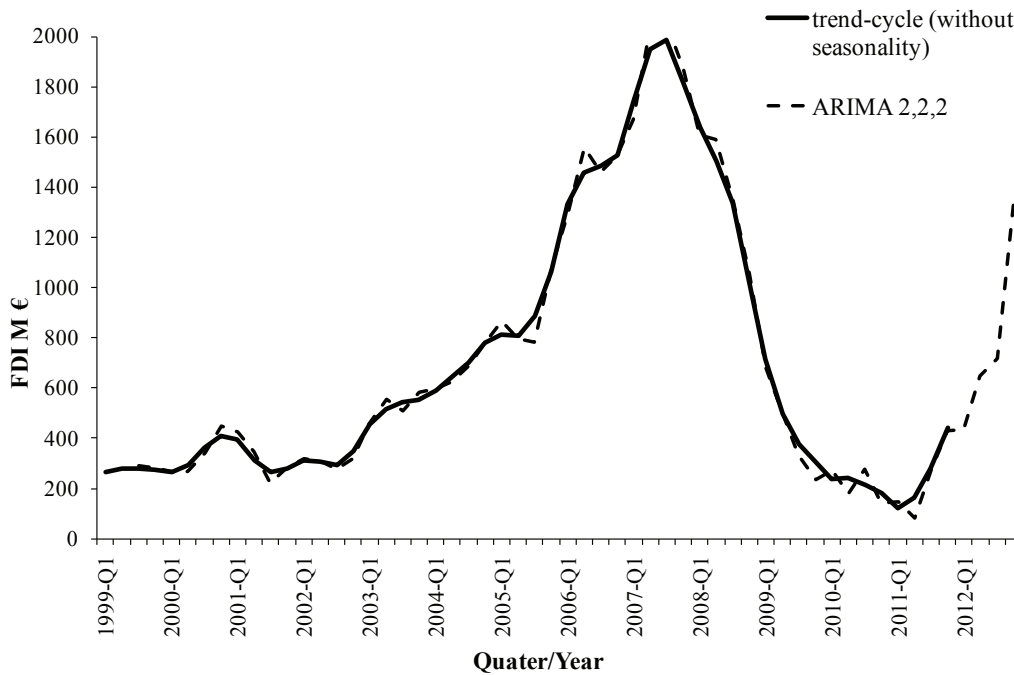


Fig.3. Foreign Direct Investments- Trend-Cycle Component and Predicted Values under ARIMA Models (1999-2011)

5. Major conclusions from the analysis

The study of the net FDI flows by quarters in the period between 1999 and 2011 shows that there is a clearly observed seasonality – flows are characterized by levels below the average during the first three quarters, whereas in the fourth quarter they are 40% higher than the annual average. For the period between 1999 and 2011 an increase in the net flows was observed and the rates of growth were highest at the end of the sub-period

the country for the first four months of 2012. The forecast results have analytical character and can be used to assist the national accountants in the preliminary evaluation of particular Balance of Payment entries.

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