

Секция «9. Количественные методы и информационные технологии в финансах и экономике»

Экономический анализ ВВП

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Financial University under the Government of the Russian Federation International Finance Faculty Department of Mathematical modeling of economic processes CREATIVE RESEARCH Prepared by: Gaydukova Sophie IFF3-3 Tutor: Tregub I.V., PhD, Professor Moscow 2013 In my creative research I am going to create an econometric model that concerns all my econometric models. . I am going to take Poland as a country under the consideration of these laws. This research is expected to be rather interesting and exciting but at the same time I should collect and analyze much data. At the beginning of my work I am going to present information about the laws themselves. One of the model is Foreign Direct Investment-million, Here, the goods market has a direct impact on the money market. Income is a determinant of demand for money. When income increases there is an increase in the demand for money. The money market also has an impact on the goods market. This is because investment is related to the interest rate. (@ @) Econometric model Where Y_t stands for GDP which is measured in billions I - Investment in billions i - Interest rate which is measured in percent and M stands for Money supply GDP is the monetary value of all the finished goods and services produced within a country's borders in a specific time period, though GDP is usually calculated on an annual basis. It includes all of private and public consumption, government outlays, investments and exports less imports that occur within a defined territory. GDP is commonly used as an indicator of the economic health of a country, as well as to gauge a country's standard of living. Critics of using GDP as an economic measure say the statistic does not take into account the underground economy - transactions that, for whatever reason, are not reported to the government. Others say that GDP is not intended to gauge material well-being, but serves as a measure of a nation's productivity, which is unrelated. The data can be found here: <http://russian.doingbusiness.org/data/exploreconomie..> Investment is an asset or item that is purchased with the hope that it will generate income or appreciate in the future. In an economic sense, an investment is the purchase of goods that are not consumed today but are used in the future to create wealth. In finance, an investment is a monetary asset purchased with the idea that the asset will provide income in the future or appreciate and be sold at a higher price. The building of a factory used to produce goods and the investment one makes by going to college or university are both examples of investments in the economic sense. In the financial sense investments include the purchase of bonds, stocks or real estate property. Investing usually involves the creation of wealth whereas speculating is often a zero-sum game; wealth is not created. Although speculators are often making informed decisions,

speculation cannot usually be categorized as traditional investing. Interest rate is the amount charged, expressed as a percentage of principal, by a lender to a borrower for the use of assets. Interest rates are typically noted on an annual basis, known as the annual percentage rate (APR). The assets borrowed could include, cash, consumer goods, large assets, such as a vehicle or building. Interest is essentially a rental, or leasing charge to the borrower, for the asset's use. In the case of a large asset, like a vehicle or building, the interest rate is sometimes known as the "lease rate". When the borrower is a low-risk party, they will usually be charged a low interest rate; if the borrower is considered high risk, the interest rate that they are charged will be higher. Interest is charged by lenders as compensation for the loss of the asset's use. In the case of lending money, the lender could have invested the funds instead of lending them out. With lending a large asset, the lender may have been able to generate income from the asset should they have decided to use it themselves. The interest owed when compounding is taken into consideration is higher, because interest has been charged monthly on the principal + accrued interest from the previous months. For shorter time frames, the calculation of interest will be similar for both methods. As the lending time increases, though, the disparity between the two types of interest calculations grows. The data can be found here: <https://www.cia.gov/library/publications/the-world-fa..> The money supply is the entire stock of currency and other liquid instruments in a country's economy as of a particular time. The money supply can include cash, coins and balances held in checking and savings accounts. Economists analyze the money supply and develop policies revolving around it through controlling interest rates and increasing or decreasing the amount of money flowing in the economy. Money supply data is collected, recorded and published periodically, typically by the country's government or central bank. Public and private sector analysis is performed because of the money supply's possible impacts on price level, inflation and the business cycle. In the United States, the Federal Reserve policy is the most important deciding factor in the money supply. The various types of money in the money supply are generally classified as "M"s such as M0, M1, M2 and M3, according to the type and size of the account in which the instrument is kept. Not all of the classifications are widely used, and each country may use different classifications. M0 and M1, for example, are also called narrow money and include coins and notes that are in circulation and other money equivalents that can be converted easily to cash. M2 included M1 and, in addition, short-term time deposits in banks and certain money market funds. An increase in the supply of money typically lowers interest rates, which in turns generates more investment and puts more money in the hands of consumers, thereby stimulating spending. Businesses respond by ordering more raw materials and increasing production. The increased business activity raises the demand for labor. The opposite can occur if the money supply falls or when its growth rate declines. The correlation coefficients between the variables were calculated by using the Data Analysis function. From the coefficients we can conclude that: There is strong positive linear relationship between GDP and Investment, Negative linear relationship between GDP and Interest rate, Strong positive linear relationship between GDP and Money supply, Negative linear relationship between Investment and Interest rate, Positive linear relationship between Investment and Money supply, Negative linear relationship between Interest rate and Money supply The scatter diagrams created to show the linear relationship present that: there is positive linear relationship between Gross Domestic Product and Investment no linear relationship between Gross Domestic Product and Interest rate no linear relationship between Interest rate and

Money supply To make the regression analysis of the money market interest rate model I had to apply the function LINEAR (in Russian Excel ЛИНЕЙН) to calculate the coefficients: standard deviation, F, R squared, Sai and the variables a0, a1, and a2. To present the full regression analysis I used the Data Analysis pack, which helps not only to calculate the coefficients but also to construct the residual value graphs for Money supply and GDP. The analysis of the F critical shows us that F is greater than F critical (3,55455715), so the model itself can be named working. To make the regression analysis of the money market GDP model I had to apply the function LINEAR (in Russian Excel ЛИНЕЙН) to calculate the coefficients: standard deviation, F, R squared, Sai and the variables a0, a1, and a2. To present the full regression analysis I used the Data Analysis pack, which helps not only to calculate the coefficients but also to construct the residual value graphs for Investment and Interest rate. The analysis of the F critical shows us that F is greater than F critical (3,55455715), so the model itself can be named working. Multiplier-accelerator model. It is a model for the business cycle at the macroeconomic level. The accelerator-multiplier model is cyclical and has three phases. First, the government increases its expenditures, which increases consumer income. The increase in income leads consumers to buy more goods and services, which increases economic output. The higher output leads to higher investment in the economy. As the name implies, it combines the Keynesian multiplier model with the accelerator model. (@@)Econometric model Where Ct stands for Consumer spending and is measured in billions I is Investment in billions Vt is Income in billions Consumer spending is the amount of money spent by households in an economy. The spending includes durables, such as washing machines, and nondurables, such as food. It is also known as consumption, and is measured monthly. John Maynard Keynes considered consumer spending to be the most important determinant of short-term demand in an economy. Often these monthly numbers are compared to the previous month or the same month of the previous year. When the government wants to stimulate the economy it will attempt to increase consumer spending. This can be done by tax cuts or even through giving out a lump sum or money. The increased income is expected to cause individuals to buy more, which means companies will experience higher revenues and can potentially hire more workers. The data can be found here: <http://www.polandinfo.ru/Container/Details/876> Investment is an asset or item that is purchased with the hope that it will generate income or appreciate in the future. In an economic sense, an investment is the purchase of goods that are not consumed today but are used in the future to create wealth. In finance, an investment is a monetary asset purchased with the idea that the asset will provide income in the future or appreciate and be sold at a higher price. The building of a factory used to produce goods and the investment one makes by going to college or university are both examples of investments in the economic sense. In the financial sense investments include the purchase of bonds, stocks or real estate property. Investing usually involves the creation of wealth whereas speculating is often a zero-sum game; wealth is not created. Although speculators are often making informed decisions, speculation cannot usually be categorized as traditional investing. The data can be found here: <http://www.polandinfo.ru/Container/Details/878> Income is the money that an individual or business receives in exchange for providing a good or service or through investing capital. Income is consumed to fuel day-to-day expenditures. Most people age 65 and under receive the majority of their income from a salary or wages earned from a job. Investments, pensions and Social Security are primary

sources of income for retirees. In businesses, income can refer to a company's remaining revenues after all expenses and taxes have been paid. In this case, it is also known as "earnings". Most forms of income are subject to taxation. Most individuals gain income through earning wages by working and/or making investments into financial assets like stocks, bonds and real estate. In most countries, earned income is taxed by the government before it is received. The revenue generated by income taxes finances government actions and programs as determined by federal and state budgets. The IRS calls income from sources other than a job, such as investment income, "unearned income". The wages, salaries, interest, dividends, business income, capital gains, pension and annuity payments, rental income, farming and fishing income, unemployment compensation, jury duty pay, gambling income, bartering income, retirement plan distributions and stock options an individual receives in a given tax year are considered taxable income in the United States. Types of income that may be tax-exempt include interest income from U.S. Treasury securities (which is exempt at the state and local levels), interest from municipal bonds (which is potentially exempt at the federal, state and local levels) and capital gains that are offset by capital losses. Types of income that may be taxed at lower rates include qualified dividends and long-term capital gains. Social Security income is sometimes taxable, depending on how much other income the taxpayer receives during the year. The money an individual has left after taxes are subtracted from income is called disposable income. Most people spend this money on necessities like housing, food and transportation and on discretionary items like restaurant meals, vacations and cable television. The data can be found here: <http://www.polandinfo.ru/Container/Details/878> The correlation coefficients between the variables were calculated by using the Data Analysis function. From the coefficients we can conclude that: There is strong positive linear relationship between Consumer spending and Investment, Positive linear relationship between Consumer spending and Income, Positive linear relationship between Investment and Income The scatter diagrams created to show the linear relationship present that: There is positive linear relationship between Consumer spending and Income positive linear relationship between Investment and Income To make the regression analysis of the Multiplier – Accelerator Consumer Spending model I had to apply the function LINEAR (in Russian Excel ЛИНЕЙН) to calculate the coefficients: standard deviation, F, R squared, Sai and the variables a0 and a1. To make the regression analysis of the Multiplier – Accelerator Consumer Spending model I had to apply the function LINEAR (in Russian Excel ЛИНЕЙН) to calculate the coefficients: standard deviation, F, R squared, Sai and the variables a0 and a1. To present the full regression analysis I used the Data Analysis pack, which helps not only to calculate the coefficients but also to construct the residual value graph for Income. The analysis of the F critical shows us that F is greater than F critical (4,380749692), so the model itself can be named working. To make the regression analysis of the Multiplier – Accelerator Investment model I had to apply the function LINEAR (in Russian Excel ЛИНЕЙН) to calculate the coefficients: standard deviation, F, R squared, Sai and the variables a0 and a1. To present the full regression analysis I used the Data Analysis pack, which helps not only to calculate the coefficients but also to construct the residual value graph for Income. The analysis of the F critical shows us that F is greater than F critical (4,380749692), so the model itself can be named working. For the Multiplier –Accelerator ii collected data on FDI in *blnandGrossDomesticincomeinbln* from World Bank's site . (databank.worldbank.org/data/accelerator/id/47afa5c9) endogenous variable

(Y) –an internal variable of a model in my model are consumption and investment Consumption – number of all final goods consumed by economy during the period Foreign direct investment (FDI) is direct investment into production in a country by a company in another country, either by buying a company in the target country or by expanding operations of an existing business in that country. exogenous variables (X1)–external variables of my model : Gross Domestic Income (GDI) is the total income received by all sectors of an economy within a nation. It- investment in Yt- income in bln *Ct–consumptioninbln* Financial University under the Government of the Russian Federation International Finance Faculty Department of Mathematical modeling of economic processes CREATIVE RESEARCH Prepared by: Gaydukova Sophie IFF3-3 Tutor: Tregub I.V., PhD, Professor Moscow 2013 In my creative research I am going to create an econometric model that concerns all my econometric models. . I am going to take Poland as a country under the consideration of these laws. This research is expected to be rather interesting and exciting but at the same time I should collect and analyze much data. At the beginning of my work I am going to present information about the laws themselves. One of the model is Foreign Direct Investment-million, Here, the goods market has a direct impact on the money market. Income is a determinant of demand for money. When income increases there is an increase in the demand for money. The money market also has an impact on the goods market. This is because investment is related to the interest rate. (@ @) Econometric model Where Yt stands for GDP which is measured in billions I - Investment in billions i - Interest rate which is measured in percent and M stands for Money supply GDP is the monetary value of all the finished goods and services produced within a country's borders in a specific time period, though GDP is usually calculated on an annual basis. It includes all of private and public consumption, government outlays, investments and exports less imports that occur within a defined territory. GDP is commonly used as an indicator of the economic health of a country, as well as to gauge a country's standard of living. Critics of using GDP as an economic measure say the statistic does not take into account the underground economy - transactions that, for whatever reason, are not reported to the government. Others say that GDP is not intended to gauge material well-being, but serves as a measure of a nation's productivity, which is unrelated. The data can be found here: <http://russian.doingbusiness.org/data/exploreconomie..> Investment is an asset or item that is purchased with the hope that it will generate income or appreciate in the future. In an economic sense, an investment is the purchase of goods that are not consumed today but are used in the future to create wealth. In finance, an investment is a monetary asset purchased with the idea that the asset will provide income in the future or appreciate and be sold at a higher price. The building of a factory used to produce goods and the investment one makes by going to college or university are both examples of investments in the economic sense. In the financial sense investments include the purchase of bonds, stocks or real estate property. Investing usually involves the creation of wealth whereas speculating is often a zero-sum game; wealth is not created. Although speculators are often making informed decisions, speculation cannot usually be categorized as traditional investing. Interest rate is the amount charged, expressed as a percentage of principal, by a lender to a borrower for the use of assets. Interest rates are typically noted on an annual basis, known as the annual percentage rate (APR). The assets borrowed could include, cash, consumer goods, large assets, such as a vehicle or building. Interest is essentially a rental, or leasing charge to the borrower, for the asset's use. In the case

of a large asset, like a vehicle or building, the interest rate is sometimes known as the "lease rate". When the borrower is a low-risk party, they will usually be charged a low interest rate; if the borrower is considered high risk, the interest rate that they are charged will be higher. Interest is charged by lenders as compensation for the loss of the asset's use. In the case of lending money, the lender could have invested the funds instead of lending them out. With lending a large asset, the lender may have been able to generate income from the asset should they have decided to use it themselves. The interest owed when compounding is taken into consideration is higher, because interest has been charged monthly on the principal + accrued interest from the previous months. For shorter time frames, the calculation of interest will be similar for both methods. As the lending time increases, though, the disparity between the two types of interest calculations grows. The data can be found here: <https://www.cia.gov/library/publications/the-world-fa..> The money supply is the entire stock of currency and other liquid instruments in a country's economy as of a particular time. The money supply can include cash, coins and balances held in checking and savings accounts. Economists analyze the money supply and develop policies revolving around it through controlling interest rates and increasing or decreasing the amount of money flowing in the economy. Money supply data is collected, recorded and published periodically, typically by the country's government or central bank. Public and private sector analysis is performed because of the money supply's possible impacts on price level, inflation and the business cycle. In the United States, the Federal Reserve policy is the most important deciding factor in the money supply. The various types of money in the money supply are generally classified as "M"s such as M0, M1, M2 and M3, according to the type and size of the account in which the instrument is kept. Not all of the classifications are widely used, and each country may use different classifications. M0 and M1, for example, are also called narrow money and include coins and notes that are in circulation and other money equivalents that can be converted easily to cash. M2 included M1 and, in addition, short-term time deposits in banks and certain money market funds. An increase in the supply of money typically lowers interest rates, which in turns generates more investment and puts more money in the hands of consumers, thereby stimulating spending. Businesses respond by ordering more raw materials and increasing production. The increased business activity raises the demand for labor. The opposite can occur if the money supply falls or when its growth rate declines. The correlation coefficients between the variables were calculated by using the Data Analysis function. From the coefficients we can conclude that: There is strong positive linear relationship between GDP and Investment, Negative linear relationship between GDP and Interest rate, Strong positive linear relationship between GDP and Money supply, Negative linear relationship between Investment and Interest rate, Positive linear relationship between Investment and Money supply, Negative linear relationship between Interest rate and Money supply The scatter diagrams created to show the linear relationship present that: there is positive linear relationship between Gross Domestic Product and Investment no linear relationship between Gross Domestic Product and Interest rate no linear relationship between Interest rate and Money supply To make the regression analysis of the money market interest rate model I had to apply the function LINEAR (in Russian Excel ЛИНЕЙН) to calculate the coefficients: standard deviation, F, R squared, Sai and the variables a0, a1, and a2. To present the full regression analysis I used the Data Analysis pack, which helps not only to calculate the coefficients but also to construct the residual value graphs for Money supply and GDP. The

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before it is received. The revenue generated by income taxes finances government actions and programs as determined by federal and state budgets. The IRS calls income from sources other than a job, such as investment income, "unearned income". The wages, salaries, interest, dividends, business income, capital gains, pension and annuity payments, rental income, farming and fishing income, unemployment compensation, jury duty pay, gambling income, bartering income, retirement plan distributions and stock options an individual receives in a given tax year are considered taxable income in the United States. Types of income that may be tax-exempt include interest income from U.S. Treasury securities (which is exempt at the state and local levels), interest from municipal bonds (which is potentially exempt at the federal, state and local levels) and capital gains that are offset by capital losses. Types of income that may be taxed at lower rates include qualified dividends and long-term capital gains. Social Security income is sometimes taxable, depending on how much other income the taxpayer receives during the year. The money an individual has left after taxes are subtracted from income is called disposable income. Most people spend this money on necessities like housing, food and transportation and on discretionary items like restaurant meals, vacations and cable television. The data can be found here: <http://www.polandinfo.ru/Container/Details/878> The correlation coefficients between the variables were calculated by using the Data Analysis function. From the coefficients we can conclude that: There is strong positive linear relationship between Consumer spending and Investment, Positive linear relationship between Consumer spending and Income, Positive linear relationship between Investment and Income The scatter diagrams created to show the linear relationship present that: There is positive linear relationship between Consumer spending and Income positive linear relationship between Investment and Income To make the regression analysis of the Multiplier – Accelerator Consumer Spending model I had to apply the function LINEAR (in Russian Excel ЛИНЕЙН) to calculate the coefficients: standard deviation, F, R squared, Sai and the variables a0 and a1. To make the regression analysis of the Multiplier – Accelerator Consumer Spending model I had to apply the function LINEAR (in Russian Excel ЛИНЕЙН) to calculate the coefficients: standard deviation, F, R squared, Sai and the variables a0 and a1. To present the full regression analysis I used the Data Analysis pack, which helps not only to calculate the coefficients but also to construct the residual value graph for Income. The analysis of the F critical shows us that F is greater than F critical (4,380749692), so the model itself can be named working. To make the regression analysis of the Multiplier – Accelerator Investment model I had to apply the function LINEAR (in Russian Excel ЛИНЕЙН) to calculate the coefficients: standard deviation, F, R squared, Sai and the variables a0 and a1. To present the full regression analysis I used the Data Analysis pack, which helps not only to calculate the coefficients but also to construct the residual value graph for Income. The analysis of the F critical shows us that F is greater than F critical (4,380749692), so the model itself can be named working. For the Multiplier – Accelerator iI collected data on FDI in *blnandGrossDomesticIncomeinbln* from World Bank's site . (databank.worldbank.org/data/accelerator/id/47afa5c9) endogenous variable (Y) –an internal variable of a model in my model are consumption and investment Consumption – number of all final goods consumed by economy during the period Foreign direct investment (FDI) is direct investment into production in a country by a company in another country, either by buying a company in the target country or by expanding operations of an existing business in that country. exogenous variables (X1)–external variables of my model : Gross

Domestic Income (GDI) is the total income received by all sectors of an economy within a nation. It- investment in Y_t - income in bln C_t -consumption in bln