Direct Investment in Modern Economy and the Role Played by Companies to That Effect

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Abstract

The financial theory has taken on the increase of the present value of the shareholders’ and associates’ fortune and turned it into the essential objective of economic activity.

Uncertainty does not affect only economic decisions but also our everyday life: a company must decide on the stock it acquires before knowing precisely what the demand will be; a person engaged in litigation must choose between reaching an agreement and taking the risk of going to trial; a speculative investor must decide whether to purchase an asset or not, before knowing if it can be sold for profit.

This article includes a macroeconomic approach to investment, the investigation tackling the part played by the gross capital formation in Romania’s economic growth after the 1989 Revolution, compared to other European countries, as well as the formation and depreciation of the capital stock, set against the background of neoclassical theories. Nevertheless, the most part of the article focuses on the role of the companies in carrying out investments as well as the integration of investment policies within the strategic management of companies.

A set of rules regarding the execution of profitable strategic projects is difficult to issue. Managers must be creative and fast in detecting new chances of investment. Virtually, the projects that need to be carried out must refer to the specific competency domains so that they would sustain and improve the competitive advantage. The market niches to be pursued are the ones where there is no competition whereas the ones which are no longer efficient should be dropped.

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1. Introduction

A company stands for an investment portfolio for the capital suppliers, associates and creditors who considered this resource allocation to be the best option at the time of the investment.

The expectations of the owners of the company must be particularly met but also those of the creditors and the task falls on the management team, who is appointed to that effect. Thus, the main objective of
the management consists in devising a strategy which will include the decision-making process regarding
the resource allocation of the company.

The fact that the financial, as well as the currency and material resources are limited and the
destinations competitive requires that they should be used in highly efficient circumstances. Upon
undertaking expenses regarding an objective or a certain activity, all eligible solutions must be carefully
considered so as to choose the best alternative which displays the most profitable input output ratio. The
financial policy must be directed towards the systematic growth of the overall cost efficiency.

Investment can be regarded as an incentive in any kind of economic activity, irrespective of its size.
Starting from the objective of conducting a profitable activity, companies carry out investment projects
which at the same time have engaging effects on the national economy, materialized in the increase in the
capital goods demand, the job creation and the progress of the entire society.

2. A macroeconomic perspective on investments

It is a fact unanimously acknowledged that investments are the driving force of economic growth. All
patterns of macroeconomic balance include investments, along with consumption as part of the aggregate
demand of an economy. For instance, Keynes introduces the concept of “investment multiplier” and the
“Harrod-Domar” highlights the role of investments in capital acquisitions as a component of the aggregate
demand through their accelerator effect. In case of a balanced economy, investments and savings are
even, the latter having the role of increasing the demand for investment goods.

The status of investments as the driving force behind economic growth is not merely a postulate used
by macroeconomists but also one which is supported by several empirical studies conducted to that effect.
For example, DeLong and Summers [1991] observe that an additional investment of one percent of the
GDP in capital assets leads to an annual increase in the GDP by a third of one percent, this being the
mechanism of economic growth. Other studies, (Barro [1991]) empirically emphasize the positive
connection between investments and economic growth, a connection the endogenous economic growth
literature is founded on. Levine and Renelt [1992] show that the share of the GDP destined for
investments is one of the few variables significantly related to the economic growth variable.

Breaking down the real growth rate of the Romanian GDP after the 1989 Revolution, it can be noticed
that starting with 2000 the physical capital has had a significantly positive contribution to the economic
growth, which is accounted for by the considerable increase in investments. Between 1991 and 1993 more
than a half of the investment expenses were directed towards the industry, followed by services
(approximately 35%) and agriculture. The explanation lies in the centralized structure of the Romanian
economy, based on industrialization and a cooperative-based agriculture.

The gradual decrease in the industry and agriculture-oriented investment led to an increase in
investment in services. This development is absolutely natural and is a result of the transformations that
have occurred in the Romanian economy throughout this period of time. The aggregate supply has
displayed a decrease in agricultural activity and a decline of the industrial department while construction
and services have boosted.

3. Determination of the capital stock and its depreciation. Replacement investments

The endogenous growth theories rule out the hypothesis regarding the exogeneity of the technological
advances and the marginal productivity of the capital stock. For example, the AK claims that the
knowledge level within an economy depends on the global capital stock.

D. W. Jorgenson, one of the pioneers of the neoclassical theory of investments, reckoned that the
replacement rate of the capital stock (δ) tends to remain stable for almost any distribution of the
consumption of capital assets, resulting in:

\[ R_{t-1} = \delta \times K_{t-1} \quad \text{and} \quad K_{t-1} = I_{t-1} + (1 - \delta) \times K_{t-1} \]
This hypothesis is confirmed by Terragrossa [1997], who conducted a study of the American economy, covering the period of time between 1947 and 1985, which showed that for equipment, the hypothesis according to which capital depreciation follows the geometrical progression pattern on an infinite horizon cannot be statistically ruled out, which means that the capital depreciation rate has a constant ratio in the capital stock.

Nwaeze [2005] submits a regression pattern in which the investment expenses of a company (ChI), made up of replacement investments (RI) and adjustment investments (AI), depend on the adjustment regarding the shift in the capital goods price (δt), the accounting depreciation (Dt) and the difference between the accounting and economic depreciation (represented by ρ, where ρ *Dt stands for the economic depreciation):

\[ \text{ChI} = \text{RIt} + \text{AIt} \quad \text{and} \quad \text{ChIt} = \delta t + \rho * \text{Dt} + \text{AIt} \]

The pattern was tested on a set of 5,478 observations, for the time span between 1978 and 1997, and the author observes that the informational relevance is bigger when the two investment categories are considered distinctly than in the case of an aggregate approach, using a unique indicator (ChI).

The study shows that a company with a valuable option for replacement but going for the adjustment is consistent with the managers’ tendency to maximize the size of the company (empire building) and the execution of less profitable adjustment projects have a negative impact on the company’s worth. However, if the adjustment projects represent new chances for profit for companies with a high profit already, the effect upon the company is a positive one.

As far as companies with valuable adjustment options are concerned, selling significant assets has a positive impact on the company’s worth (the shareholders perceive this operation as a reallocation of funds towards more profitable projects. Disinvestments, even the small-scale ones, carried out by profitable companies, with significant replacement options, have either a negative impact or no impact at all on the company’s worth.

The investment analysis in the projects involving capital goods replacement is usually restricted to choosing the best moment to replace a worn-out asset with another which will not alter the structure of the operation. The model developed by Mauer and Ott [1995] for the enactment of the decision to replace an asset involves a stochastic exploitation and maintenance cost for it, entailed by a geometrical Brownian motion:

\[ dC/C = \delta t + \sigma dW, \] where \(\delta\) is the instant cost and \(\sigma\) is its instant volatility.

\[ C \] stands for the extent of deterioration over time of the asset in question. The acquisition cost of the new asset is \(P \times (1 - \varphi)\), where \(\varphi\) is the tax credit rate granted for investments. The fiscal savings due to depreciation over time of the value of the asset is expressed by:

\[ \tau \delta P \times (1 - \varphi) \times (C_t/C_N) \] \[dt\]

where: \(\tau\) is the profits tax rate, \(\delta\) stands for the depreciation over time rate of the asset (the accounting value left at the \(t\) moment is \(P \times (1 - \varphi) \times e^{-\delta t}\)), \(C_N\) is the initial exploitation and maintenance cost for the new asset (the replacement was decided on when \(C_t\) reaches a level rated at \(C)\) and \(Z = \alpha - \sigma^2/2\).

The best of the replacement policy is not very susceptible to the alteration of the data related to the fiscal policy. The most evident recorded reaction is in the case of the alteration of the replacement price and the residual value (probably due to using the principle according to which the decision regarding the investment should minimize the replacement cost).

The effect of the technological uncertainty on replacement investments was also studied by Nair [1995], whose model is based on two hypotheses: the new technological generation determines the same profits as the old one and the actualization rate is less than one unit. Technological generations come one after another sequentially and their likelihood of emergence is variable over time. The decision to invest (in terms of replacing the old technology with the new one either when it appears or at a later time) is
structured as a decision tree, which includes the likelihood of the advent of a new technology, the costs and profits involved (which have definite values). Using the dynamic programming recursive approach, the author develops an algorithm so as to determine the best decisional horizon regarding whether to replace old technology with a new generation one, available in the market, or not.

Grenadier and Weiss [1997] advance a model which also introduces technological innovations sequentially and their value and advent are uncertain variables. The model also includes real options, that is, a company investing in current technological innovations, at the same time acquires the option to later on apply for a new technological generation, at a reduced additional cost.

4. The impact of the investment amount on the Gross Domestic Product in Romania

The natural question arises as to what the driving forces are that lead a company to choose one possible financing structure or another, depending on the specific conditions of its activity, and as to the impact of the investment amount of companies on the Gross Domestic Product. This is the why this section of the present article tackles the multicollinearity-based research of a model of regression of the impact of the investment amount on Romania’s Gross Domestic Product between 1993 and 2009.

Work hypothesis

The research started from the statement according to which a LEI 1 million increase in the investment amount leads to a LEI 5 million increase in the Gross Domestic Product. The necessary data were taken from the official web site of the National Statistics Institute of Romania and from Romania's Statistics Annual Reports. The selected information refers to the Gross Domestic Product (GDP), the investment amount (I) and the consumer price index (CPI), indicative of the period of time between 1993 and 2009 in Romania.

Table 1: GDP, the investment amount and the consumer price index 1993 – 2009

| YEAR | GDP    | I        | LN GDP  | LN I   | CPI (previous year) | LN CPI |
|------|--------|----------|---------|--------|---------------------|--------|
| 1993 | 236803.67 | 58502.3 | 12.37498668 | 10.97682135 | 100 | 4.60517 |
| 1994 | 225142.92 | 43947.05 | 12.32449068 | 10.69074078 | 270.2 | 5.599162 |
| 1995 | 198428.65  | 60985.84 | 12.19818487 | 11.01839699 | 838.8 | 6.731972 |
| 1996 | 185314.23  | 43401.21 | 12.1298082 | 10.6782426 | 2987 | 8.002025 |
| 1997 | 194343.5   | 42959.96 | 12.17738249 | 10.6680238 | 7071.9 | 8.863884 |
| 1998 | 212895.12  | 57679.3 | 12.26855493 | 10.96265364 | 9353.4 | 9.143495 |
| 1999 | 231596.07  | 70026.41 | 12.35275006 | 11.15662774 | 12983.4 | 9.471427 |
| 2000 | 211066.2   | 62959.7 | 12.25992711 | 11.05025012 | 33076.9 | 10.40659 |
| 2001 | 194695.7   | 51160.2 | 12.17919311 | 10.84271716 | 52624.2 | 10.87093 |
| 2002 | 196325.2   | 54459.4 | 12.18752775 | 10.90521075 | 76728 | 11.24802 |
| 2003 | 198459.5   | 63469.3 | 12.19834033 | 11.08933661 | 11176.1 | 11.62417 |
| 2004 | 214359.5   | 76551.3 | 12.27540979 | 11.24571638 | 150290.7 | 11.92033 |
| 2005 | 226997.6   | 81767.05 | 12.3269472 | 11.31162963 | 184162.1 | 12.12357 |
| 2006 | 256779.5   | 96655.7 | 12.45597302 | 11.47891046 | 212291 | 12.26571 |
| 2007 | 286274.5   | 114131.7 | 12.56470642 | 11.64510832 | 237504.5 | 12.37794 |
| 2008 | 307080.45  | 116008.7 | 12.63486504 | 11.66142047 | 258912.1 | 12.46424 |
| 2009 | 344535.5   | 132995 | 12.74995241 | 11.79806681 | 275900.37 | 12.5278 |

Source: the National Statistics Institute of Romania and our own calculations

GDP = Gross Domestic Product
I = investment amount
CPI = Consumer price index
The series of transformed data (the Gross Domestic Product, the consumer price index and the investment amount) were processed through logarithming in order to be used in the application, the resulting series being lnGDP, lnI and lnCPI.

**Stage I Parameter estimation of the regression model: executed both in Excel and EVIews**

\[
\ln I = a + b \ln GDP + c \ln CPI + e;
\]

\[
\ln I = -7.217922 + 1.443059 \ln GDP + 0.054780 \ln CPI + e.
\]

**Table 2: Summary output**

| Regression Statistics |
|-----------------------|
| Multiple R            | 0.950016331 |
| R Square              | 0.902531029 |
| Adjusted R Square     | 0.888606891 |
| Standard Error        | 0.117358264 |
| Observations          | 17          |

**Table 3: Anova**

|                | Df  | SS               | MS         | F           | Significance |
|----------------|-----|------------------|------------|-------------|--------------|
| Regression     | 2   | 1.785464206      | 0.892732103| 64.81772782 | 8.35727E-08  |
| Residual       | 14  | 0.192821468      | 0.013772962|             |              |
| Total          | 16  | 1.978285674      |            |             |              |

|                | Coefficients | Standard Error | t Stat  | P-value     | Lower 95%   |
|----------------|--------------|----------------|---------|-------------|-------------|
| Intercept      | -7.217921986 | 2.194524679    | -3.289059383 | 0.005378094 | -11.92471349|
| X Variable 1   | 1.443058657  | 0.181767169    | 7.939050088 | 1.4968E-06  | 1.053206506 |
| X Variable 2   | 0.054779519  | 0.012667519    | 4.324407788 | 0.000699731 | 0.027610368 |

|                | Upper 95% | Lower 95%   |
|----------------|-----------|-------------|
| Intercept      | -2.511130482 | -11.92471349| -2.511130482|
| X Variable 1   | 1.832910807 | 1.053206506 | 1.832910807 |
| X Variable 2   | 0.081948669 | 0.027610368 | 0.081948669 |

**Table 4: Residual output**

| Observation | Predicted GDP | Residuals | Percentile | GDP |
|-------------|---------------|-----------|------------|-----|
| 1           | 10.89217868   | 0.084642672| 2.941176471| 10.6680238|
| 2           | 10.8737604    | -0.183019623| 8.823529412| 10.6782426|
| 3           | 10.75354849   | 0.264848497| 14.70588235| 10.69074078|
| 4           | 10.72444982   | -0.046207215| 20.58823529| 10.84271716|
| 5           | 10.84031456   | -0.17290761 | 26.47058824| 10.90521075|
| 6           | 10.98719868   | -0.02454504 | 32.35294118| 10.96265364|
| 7           | 11.12666112   | 0.029966613| 38.23529412| 10.97682135|
| 8           | 11.04393997   | 0.0006310146| 44.11764706| 11.01839699|
| 9           | 10.95287245   | -0.11015528 | 50         | 11.05025012 |
Following the analysis of the regression table, it can be stated that: the coefficient of determination has high values, close to 1, which is why we could assess that the regression model is a good one as there is an interdependence between the variables considered in the analysis. Moreover, this determination report shows that 90% of the investment amount variation is accounted for by the GDP and CPI variation.

As far as the t statistics is concerned, for b and c parameters, the null hypothesis can be overruled (0 values for the parameters estimation) as calculated t is higher than table t for a 0.05 significance level. For a free parameter, calculated t is lower than table t (1.746) which is why the null hypothesis cannot be ruled out. The F statistics provides a higher probability in supporting the validity of the built model deeming that the regression model properly adapts the data from the sample.

**Stage II Determining the correlation matrix**

**Table 6: Correlation matrix**

|       | LN GDP | LN CPI | LN I  |
|-------|--------|--------|-------|
| LN GDP| 1      |        |       |
| LN CPI| 0.398254 | 1     |       |
| LN I  | 0.878827 | 0.680971 | 1     |

The correlation matrix between the variables introduced in the model show a strong connection between the investment amount in the analyzed period of time and the GDP (the value of the correlation report being approximately 90%), the only one significantly away from 0.

Moreover, as the correlation matrix indicates, there is a strong connection between the “investment amount” and GDP variables (0.878827), the fundamental hypothesis of the regression model – the autonomy of the independent variables – thus being broken. In this case, we are faced with the multicollinearity of data. In these circumstances, the statement according to which a LEI 1 million increase in the investment amount leads to a LEI 5 million increase in the Gross Domestic Product is utterly questionable.

5. Conclusions

Fostering investments in Romania together with making the most of the current specific opportunities can be important measures in view of diminishing the impact of the economic and financial crisis.

Great emphasis is currently laid on strategic orientation of investments worldwide, which entail that managers’ knowledge must not be restricted to the present socio-economic environment but extend to the future one and that they must find out the causes of changes. This means that only the presumably successful projects will be implemented that will have useful effects all throughout their economic lifespan, within an ever-changing and more often than not hostile socio-economic environment. This approach has greater importance in the field of public works where each project must match the strategic coordinates of the local and/or national socio-economic development.

Several authors have focused their attention on the companies’ choice of the capital structure, thus empirically sanctioning or invalidating the practical use of modern theories concerning the financing
decision. Most of the times these studies determine the existence of a preference order in the choice of financing sources.

In cases of financial restraints the impact of the macroeconomic factors on the choice of capital structure also varies. Companies with sufficient internal resources for investment have a leverage that varies by a reverse recurrence in relation to the macroeconomic conditions (managers prefer to issue debt when the profitability of the market securities is low). Companies relying on external financing sources and are financially restrained have a leverage that varies by a direct recurrence in relation to the macroeconomic conditions (managers prefer to borrow when the value of their assets that can be used as collateral is high, which happens when the profitability of the securities is high).

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References

[1] Alleman, James, Rappoport Paul, “Optimal Pricing with Sunk Cost and Uncertainty”, in R. Cooper and all., The Economics of Online Markets and Information Communications and Technology Networks: Contribution to Economics Series, Physica-Verlag, Heidelberg; (2006).

[2] Băcescu Marius, Băcescu-Cărbunaru A., Dumitrescu F., Condruez-Băcescu M., – „Macroeconomical policies of the Romanian Integration in the European Union”, Economic Publishing House, Bucharest; (2008).

[3] Barro, R.J., “Economic Growth in a Cross Section of Countries”, Quarterly Journal of Economics, Vol. 106; (1991), pp.407 – 443.

[4] DeLong, L and Summers, L. “Equipment Investment and Economic Growth”, Quarterly Journal of Economics, Vol. 106; (1991), pp. 445 – 502.

[5] Fama, E.F. and French, K.R., “Pofitability, Investment and Average Returns”, Journal of Financial Economics, Vol.82, No.3 (December); (2006), pp. 491 – 518.

[6] Ghossoub, E. and Reed, R., “Liquidity risk, economic development, and the effects of monetary policy”, European Economic Review, Volume 54, Issue 2 (February); (2010), pp. 252 – 268.

[7] Grenadier, S.R. and Weiss, A.M., “Investment in Technological Innovations: An Option Pricing Approach”, Journal of Financial Economics, Vol.44, No.3 (June); (1997), pp. 397 – 416.

[8] Jorgenson, D.W., “The Economic Theory of Replacement and Depreciation”, in W. Sellekoerts (Editor), “Essays in Honor Of Jan Tinbergen”, White Plains, International Arts and Sciences Press; (1973), pp. 189 – 211.

[9] Keynes, J.M., “The General Theory of Employment, Interest and Money”, London Macmillan, (1936).

[10] Keynes, J.M., “The ‘Ex Ante’ Theory of the Rate of Interest”, Economic Journal 47 (188): 9 – 663; 1937. Reprinted in The Collected Writings of John Maynard Keynes, Volume XIV, London Macmillan for the Royal Economic Society, (1973), pp. 23 – 215.

[11] Levine, R. and Renelt D., “A Sensitivity Analysis of Cross-Country Growth Regressions”, American Economic Review, Vol.82, No.4; (1992), pp. 942 – 963.

[12] Mauer, D. and Ott, S., “Investment under Uncertainty: The Case of Replacement Investment Decisions”, Journal of Financial and Quantitative Analysis, Vol.30, Issue 4; (1995), pp. 581 – 605.

[13] Nair, S., “Modeling Strategic Investment Decisions under Sequential Technological Change”, Management Science, Vol.41, No2, (February); (1995), pp. 282 – 297.

[14] Nwaeze, E.T., “Replacement Versus Adaptation Investment and Equity Value”, Journal of Corporate Finance, Vol.11, No.3 (June); (2005), pp. 523 – 549.

[15] Terragrossa, R.A., “Capital Depreciation and Investment Demand”, The Quarterly Review of Economics and Finance, Vol.37; (1997), pp. 79 – 95.