Department of
Economics and Finance

Working Paper No. 14-04

Economics and Finance Working Paper Series

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April 2014

http://www.brunel.ac.uk/economics

STATE AID POLICY IN THE EUROPEAN UNION

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Abstract

Industrial policy is an important tool of economic policy-making, especially so since the onset of the current global financial crisis in 2008. However, only relatively few empirical studies consider the macroeconomic effects of industrial policy, especially for the European Union countries. In this study, we investigate the effect of state aid policy on economic growth and investment, using a panel data set which covers 27 European Union countries over the period 1992-2011. Our results suggest that state aid policy is not an effective tool to achieve higher economic growth and investment rates in the European Union.

Key Words: *European Union, State Aid, Solow Model, Growth, Investment*
JEL Codes: *E22, E61, L50, O47,*

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1. INTRODUCTION

Recently, increasing concerns about the international competitiveness of the European Union countries together with the deindustrialisation process in the European Union (Bianchi and Labory, 2011: 130; Legarda and Blazquez, 2013: 3) has stimulated a new debate about industrial policy. In 2000, European Union countries met in Lisbon and determined a new strategy, namely the Lisbon Strategy, in order to boost the international competitiveness of member countries (Bianchi and Labory, 2011: 130, 131). In response to the 2008 economic crisis, European Union has set out a new integrated industrial policy strategy which emphasises the importance of strong and diversified manufacturing value chain for the competitiveness and job creation potential of the European Union (European Commission, 2010: 3). Consequently, the importance of industrial policy as a tool of economic policy making in the European Union countries has increased considerably in recent years.

Despite these developments, the number of studies that examine the effectiveness of industrial policy in European Union countries at the macro level has remained quite low. In this study, we try to fill this gap in the literature by investigating the effects of state aid policy on economic growth and investment in the European Union countries. We use the most comprehensive data set available on state aid and we consider all of the European Union countries. Hence, our study is one of the most comprehensive studies in terms of data coverage at the macro level.

The rest of the paper is structured as follows: In section 2, we briefly explain the theoretical arguments behind industrial policy and the results of the previous empirical studies which investigate the industrial policy of the European Union. In section 3 we overview state aid policy in the European Union. In section 4, we present our data set and empirical methodology. In sections 5 and 6, we discuss the results of the regressions in which we use economic growth and investment as the dependent variables. In the last section, we offer some concluding remarks.

2. LITERATURE REVIEW

Although industrial policy is a much-debated issue in economics literature, economists and policy makers have not reached a consensus on the definition of industrial policy. There are a number of different perspectives on its objectives and instruments (Evenett, 2003: 15-18). Hence, the definition of industrial policy changes with regard to these different objectives and instruments. One of the commonly used definitions was put forward by Pack and Saggi who describe it *"as any type of selective government intervention or policy that attempts to alter the structure of production in favour of sectors that are expected to offer better prospects for economic growth in a way that would not occur in the absence of such intervention in the market equilibrium"* (Pack, Saggi, 2006: 267, 268).

At the European Union level, industrial policy is defined as those policies that affect the cost, price and innovative competitiveness of the industry (such as standardisation or innovation policies) or sectorial policies focusing on the innovation performance of individual sectors (European Commission, 2010: 4). According to this definition, industrial policy includes both horizontal and sectorial measures.

The main economic rationale behind industrial policy is to increase efficiency. This view asserts that governments intend to correct market failures, such as externalities, asymmetric information or market power, and coordination problems (Hölscher et al., 2010: 6). One of the most significant externalities in terms of countries' competitiveness, namely Marshallian externalities, arises when firms take advantage of the production and innovation activities of the other firms in the same or related industries. In this case, providing a subsidy to the firms creating the Marshallian externality would be the optimal policy (Rodriguez-Clare, 2007: 43-44).

Another justification for industrial policy is about asymmetric information. In the financial markets, firms, especially small and medium sized enterprises, might have difficulties in borrowing since the risk and profit of these firms' projects are not evaluated properly a priori by financial institutions (Hölscher et al., 2010: 6).

Finally, coordination problems are an important motivation for contemporary industrial policy. Such problems arise when a given industry remains locked into an old and inefficient standard. Since moving to a better standard, which is beneficial for everybody, requires coordination across many actors, government intervention may provide to reach desired outcomes (Warwick, 2013: 22). A classic example of a coordination failure is the use of QWERTY layout in typewriters which is still used in computer keyboards today. An alternative and more efficient layout (namely the Dvorak keyboard), which enables people to write 20-40% faster, was invented after the QWERTY keyboards had been launched. Nevertheless, the alternative Dvoral keyboard continues to be sparsely used and and the QWERTY layout still dominates typewriters and computer keyboards (David, 1985: 332).

In contrast to the above arguments in favour of industrial policy, there are also counter-arguments which cast doubt on the effectiveness of this kind of policies. The first counter-argument which is usually stated as "governments cannot pick winners" asserts that because of asymmetric information it is not possible for governments to determine the firms, sectors or industries in which market failure prevails. The second counter-argument suggests that industrial policy leads to corruption and rent-seeking. Accordingly, if the government provides support to the industry, entrepreneurs spend much

of their time to gain these benefits rather than searching for new ways to decrease their costs (Rodrik, 2008: 7, 8).

From the above discussion, it is obvious that the success of industrial policy depends considerably on the political system and institutions of the country in question. However, there is always a risk of government failures even in countries where there is a well-functioning political system. Therefore, in recent years there has been a trend towards a new industrial policy, namely "soft" industrial policy which provides a more facilitative and coordinating role to the government (Warwick, 2013: 23, 24).

Existing studies about industrial policy can be classified into two main groups. In the first category, there are studies which investigate the effects of industrial policy at the country level while in the second category, industrial policy is examined at the firm level.

Gual and Jodar-Rosell (2006), Aghion et al. (2011) and Stöllinger and Holzner (2013) fall into the first category. Since the main instrument of industrial policy is state aid, all of these studies take into account state aid as their main independent variable. Gual and Jodar-Rosell (2006) examine the effect of vertical state aid policy on multi factor productivity of manufacturing sector in 11 European Union countries over the period 1992-2003. According to their results, vertical state aid has a positive effect on productivity growth. Aghion et al. (2011) find a positive effect of the total sectorial aid to industry and services on the exports of manufacturing and services over the period 1992-2008 in 12 European Union countries. Furthermore, by taking into account an interaction term between state aid and financial development, they conclude that state aid is more effective in financially less developed countries. Similarly, Stöllinger and Holzner (2013) try to explain the impact of state aid on value added exports (defined as the value added generated by the country concerned but absorbed in another country) for 27 European Unioncountries by using a data set over the period 1995-2011. In addition to this, they examine whether effective governments are more successful in terms of applying state aid policy. They find that while provision of state aid to manufacturing increases export competitiveness, government effectiveness has only a minor impact on the success of state aid policy.

The studies that investigate industrial policy at the firm level are much more numerous than the country level studies. These analyses mainly focus on one of the subcomponents of industrial policy, namely regional policy. For example, Wren and Taylor (1999) examine the effect of regional policy on the employment structure of the assisted areas by using annual panel data for 12 UK regions over the period 1971-1994 and find that regional policy encourages convergence of the supported industry to the national pattern of employment. Bronzini and De Blasio (2006) investigate whether regional policy that provides a public subsidy to firms which invest in underdeveloped areas makes investments possible that would have not materialized otherwise in Italy. By using financial

statements of 1008 Italian firms from 1994 to 2001, they come to the conclusion that the increase in investment was counterbalanced by the reduction in accumulation by the supported firms. Hence, their results raise doubts about the efficacy of industrial policy. Gobillon et al. (2012) evaluate the 1997 French Enterprise Zone Program and investigate whether the program has had a positive effect on the employment level of local residents. Using an exhaustive data set over the period 1993-2003 for the Paris region, they conclude that the enterprise zone program has had no effect on the unemployment level. Martin et al. (2011) analyse a public policy (local productive systems, LPS) which promotes industrial clusters in France. They draw on a data set which covers 345 LPS firms over the period 1996-2003 and find that the policy has no effect on employment or exports. Curiscuolo et al. (2012) examine the effect of regional selective assistance program on employment, investment and productivity in the UK by using a firm level data set which covers the period between 1986 and 2004. According to their results, although the programme has a significant effect on the treated in terms of employment and investment, it has no additional effect on productivity.

3. AN OVERVIEW OF STATE AID POLICY IN THE EUROPEAN UNION COUNTRIES

State aid is defined by the European Union as *"an advantage in any form whatsoever conferred on a selective basis to undertakings by national public authorities"* (European Commission, 2013). Articles 107 to 109 of the Treaty on the Functioning of the European Union (TFEU) set out the application and control of state aid policy in the member countries. Although article 107 (1) generally prohibits any kind of aid which distorts or threatens to distort competition, article 107 (2) and 107 (3) state the exemptions from this prohibition. According to these articles, aid having a social character, compensating the damage caused by natural disasters, granted to the certain areas of the Federal Republic of Germany affected by the division of Germany, promoting economic development of areas where the standard of living is abnormally low, promoting an important project of common European interest and remedy a serious disturbance in the economy, facilitating the development of certain activities or certain economic areas and promoting culture and heritage conservation are exempted from the prohibition (European Union, 2008: 91, 92). Hence, governments may provide state aid to specific firms and industries when the aim of the expenditure falls in with these boundaries.

State aid is regulated by the European Commission in the Directorate General Competition in the European Union. Member countries have to report all state aid measures to the Commission and these measures can only be implemented after the approval of the European Union (Hölscher, 2010: 9). Although state aid has been effectively controlled by the European Union in recent years, establishing a well-functioning system for the control of state aid took a very long time. There are several reasons behind this prolonged period (Kassim and Lyons, 2013: 3, 4): First, state aid control is politically sensitive. Second, the articles of the treaty that regulate state aid are complex and do not impose rules

at the national level. Third, member countries were not eager to cooperate with the Commission in order to operationalize the articles of the treaty and to comply with the obligations imposed. However, in conjunction with the announcement of State Aid Action Plan (SAAP), whose main aim is *"less and better targeted state aid"* (European Commission, 2005), state aid rules have become more transparent and easier to implement (Kassim and Lyons, 2013: 11). Thus, oversight of state aid policies of member countries is much better now in comparison to ten years ago.

In the European Union, state aid expenditures are divided into two main categories: 1- Horizontal expenditures and 2- Sectorial expenditures. While horizontal expenditures cover regional development aid, environmental aid (including energy saving), research-development and innovation aid, aid to small and medium sized enterprises (including risk capital); sectorial expenditures are composed of rescue and restructuring aid and aid to transport, agriculture, fisheries and aquaculture and coal, steel and shipbuilding. Figure 1 shows the evolution of total state aid expenditures together with its main subcomponents for the European Union as a whole over the period 1992-2011. As can be seen from the figure, total state aid expenditures fell from 1.10% in 1992 to 0.51% in 2011[1]. Furthermore, state aid to industry and services and sectorial state aid follow a similar pattern along as the total state aid, in contrast to horizontal state aid. However, the share of horizontal state aid shows an upward trend especially in recent years. These developments are compatible with the recent regulations which put more emphasis on horizontal state aid because of the distortive effects of sectorial measures on market mechanism (European Commission, 2005: 5).

Although state aid expenditures have had a downward trend at the European Union level since 1992, the expenditures of member countries differ from each other. Table 1 shows the averages of state aid expenditures of the member countries during the period concerned. According to the figures, Malta (3.03%) is the first country in terms of state aid expenditures. While Cyprus (1.71%), Hungary (1.71%), Portugal (1.70%) and Finland (1.68%) nearly spends 2% of their GDP for state aid measures, the level of state aid expenditures is below the 0.50% of GDP in the Netherlands (0.48%), Luxembourg (0.42%), Bulgaria (0.41%), The United Kingdom (0.30%) and Estonia (0.26%). A similar pattern is observed at the main subcomponents of state aid as well.

In summary, although the amount of state aid expenditures differs across the member countries, these expenditures have decreased considerably at the European Union level over the period 1992-2011. Furthermore, in line with the recent regulations about state aid, the composition of state aid has changed from being dominated by sectorial measures to a greater share of horizontal measures.

[1] The hike in 1997 stems from the huge increase in French sectorial aid because of the Credit Lyonnais case ((Hölscher, 2010: 10; Kassim and Lyons, 2013: 11).

4. DATA AND EMPIRICAL METHODOLOGY

In our empirical model, we draw on an unbalanced panel data set of 27 European Union countries over the period 1992-2011. Gross fixed capital formation, population growth and gross domestic product (GDP) data were obtained from the Annual Macro-Economic Database of the European Commission's Directorate General for Economic and Financial Affairs (AMECO) and the data on state aid was taken from the State Aid Scoreboard of the European Commission.

In order to examine the effects of state aid on total value added growth, we use the Solow Model of economic growth and add state aid as an additional explanatory variable to this model. In this respect, our approach is very similar to that of Fidrmuc (2008) who investigates the effects of EBRD aid on the economic growth of transition countries. As it is well known, economic growth is mainly determined by the accumulation of physical capital and population growth in the Solow Model[2]. Therefore, the model we estimate is as follows:

$$\Delta y_{it} = \beta_1 s_{it} + \beta_2 (g_{it} + n_{it} + \delta_{it}) + \beta_3 sa_{it} + \mu_i + \delta_t + u_{it} \quad (1)$$

where *y* is output per capita, *s* is the ratio of gross fixed capital formation to GDP, *n* is population growth, g and δ are technological progress and depreciation respectively, we substitute the sum of them with a constant term equal to 0.06, *sa* is the ratio of state aid (total state aid, state aid to industry and services, horizontal state aid and sectorial state aid) to GDP, μ is the country fixed effects, δ stands for time fixed effects, *u* is the error term and *i* and *t* are country and time subscripts, respectively. In the equation, all variables are in the logarithmic form.

We first estimate the above equation by using fixed effect OLS estimator. However, there is the risk of potential endogeneity of state aid and this may result biased coefficient estimates when we use this method. In order to remedy this problem, we estimate our model by two stage least square (2SLS, IV) estimator as well.

5. RESULTS

The descriptive statistics of the variables are presented in Table 1. Since our data set covers 20 years, we perform the Fisher type Augmented Dickey-Fuller and Phillip-Perron Tests proposed by Maddala and Wu (1999) and Choi (2001) to check whether our variables display unit roots. The results of these

[2] Solow Model also states that technological progress and depreciation play a part in the determination of economic growth. However, since there is no reliable measure of these variables, we substitute them with a constant term in our model as is the case with many other studies.

tests are presented in Table 3. We reject the null hypothesis of unit root for all of our variables at conventional significance levels.[3] Therefore, we conclude that our variables are stationary and there is no risk to encounter spurious regression results.

Table 4 summarises the results of fixed effect OLS regressions. Column 1, 2, 3 and 4 show the effects of total state aid, state aid to industry and services, horizontal state aid and sectorial state aid on economic growth, respectively; while column 5, 6, 7 and 8 show the effects of one period lagged values of these variables on economic growth. The investment and population growth have the expected signs and are statistically significant. In contrast, none of the state aid variables has a statistically significant and positive effect on economic growth. While the total state aid and state aid to industry and services are not statistically significant, horizontal and sectorial state aid are significant at the ten and five percent levels, respectively but have negative signs. However, their coefficient values are very close to zero. The lagged results are very similar to the previous results. The only difference is that horizontal state aid becomes statistically insignificant. In summary, state aid does not appear to have a positive effect on economic growth and if some of its subcomponents have an effect on growth, this effect is either negative or approximately zero.

However, as we stated above, the potential endogeneity of state aid variables, which stems from the simultaneity or reverse causality between state aid and economic growth, may lead to biased estimation results. To deal with this problem, we use the instrumental variable estimator for panel data developed by Schaffer (2010). In these regressions, we use the first lag of government spending on social protection, health and public order and safety as instruments[4]. Since these variables are subcategories of government spending, it is reasonable to assume that they are correlated with state aid. Furthermore, it is conceivable to assume that this kind of government expenditures does not have a direct impact on current economic growth (we discuss the formal tests of this assumption in the next paragraph). Table 5 and Table 6 present the instrumental variable estimates. There is not a big difference between the FE OLS estimations and the instrumental variable estimations. The only difference is that horizontal and sectorial state aid becomes insignificant in the latter.

In order to have reliable results in instrumental variables estimation, the instruments should be relevant and should not be strongly correlated with the dependent variable of the original model. In Table 5 and Table 6, we present some test statistics about our instruments together with the regression

[3] The only variable that may seem problematical in terms of stationarity is population growth since we can only reject the null hypothesis of unit root at ten percent level according to the result of the Augmented-Dickey Fuller Test. For this reason, we re-estimated our main regressions without population growth. Since the parameter estimates are almost the same we present the results for the standard Solow Model, with population growth included. The results of the regressions that exclude population growth are available upon request.

[4] We also used various political variables as instruments. Since none of these variables is significant in the first stage regressions, we decided to use subcategories of government expenditures as instruments.

results. According to Kleinbergen-Paap Underidentification Test, the null hypothesis that the regression is underidentified is rejected in all of our regressions. This result suggests that our instruments are relevant and sufficiently correlated with the endogenous variable. Furthermore, our regressions pass the Hansen's J Test of overidentification. In this test, the joint null hypothesis states that the instruments are valid and we cannot reject this hypothesis in none of our regressions. This means that our instruments are not strongly correlated with the dependent variable of the original model. Finally, we should check the strength of our instrumental variables. Kleinbergen-Paap F statistic is below the critical value[5] for a maximal 2SLS bias relative to the OLS results of 10% in all of our regressions except the horizontal state aid. Specifically, this statistic is around 3 which is far below the critical value for the sectorial state aid regression. Thus, these results indicate that our instruments are not very strong. The limited maximum likelihood estimation (liml) developed by Anderson and Rubin (1949, 1950) should perform better than 2SLS when the instruments are weak (Stock and Yogo, 2005; Blomquist and Dahlberg, 1999: 81). In Table 5 and Table 6, we also present LIML estimation results besides 2SLS estimations. The results of these estimations are almost identical to the results of the 2SLS estimations.

We also check whether endogeneity is an issue for total state aid and its subcomponents. According to the test results, we cannot reject the null hypothesis that the difference between the OLS estimation and the 2SLS estimation is not statistically significant. So, it seems endogeneity is not an important issue for the total state aid and its subcomponents[6].

In a nutshell, when we take into account all of the above regression results; it becomes obvious that total state aid and its subcomponents do not have an important effect on economic growth. Although horizontal and sectorial state aid is statistically significant according to the OLS estimation results, the sign of the coefficients of these variables is negative and the magnitude of these coefficients is very close to zero. So, we conclude that state aid does not make an economically significant contribution to economic growth.

6. DOES STATE AID INCREASE INVESTMENT?

So far, we investigated the effect of state aid and its subcomponents on economic growth. However, since one of the main aims of state aid is to increase the investment level of the economy it may also have an impact on gross fixed capital formation. Given that investment is one of the most robust

[5] This critical value is 9.08 for three instruments. See Stock and Yogo, 2005.
[6] We should also state that since our instruments are not very strong for state aid variables except horizontal state aid we should be cautious about interpreting OLS estimation results.

factors of growth, it is possible that state aid does not foster growth directly but has an indirect effect, through investment.

We estimate two different models in which we use economic freedom and political stability indexes together with state aid and its subcomponents as explanatory variables[7]. Furthermore, we create interaction terms between institutional variables and state aid to take account of the fact that the effect of state aid may be conditional on economic freedom and political stability. While in the first model, we use state aid, economic freedom and the interaction term between economic freedom and state aid as independent variables; in the second model we draw on state aid, political stability and the interaction term between political stability and state aid. Economic freedom and political stability indexes were obtained from the website of Heritage Foundation and the Worldwide Governance Indicators of World Bank, respectively[8]. The models we estimate are as follows:

$$s_{it} = \beta_{1t} sa_{it} + \beta_{2t} ef_{it} + \beta_{3t}(sa_{it} \times ef_{it}) + \mu_i + \delta_t + u_{it} \quad (2)$$

$$s_{it} = \beta_{1t} sa_{it} + \beta_{2t} ps_{it} + \beta_{3t}(sa_{it} \times ps_{it}) + \mu_i + \delta_t + u_{it} \quad (3)$$

where *s* is the ratio of gross fixed capital formation to GDP, *sa* is the ratio of state aid (total state aid, state aid to industry and services, horizontal state aid and sectorial state aid) to GDP, *ef* is the economic freedom index, *ps* is the political stability index, $sa_{it} \times ef_{it}$ and $sa_{it} \times ps_{it}$ are interaction terms formed by state aid and economic freedom and state aid and political stability respectively, μ is the country fixed effects, δ is the time fixed effects, *u* is the error term and *i* and *t* are country and time subscripts, respectively. In these models, all of the variables are in the logarithmic form and we use centred values of state aid and institutional variables in order to alleviate the potential multicollinearity among variables.

Tables 7 and 8 summarise the estimation results of models 2 and 3[9]. In both tables, columns 1-4 present the current effects of state aid, its subcomponents and the relevant institutional variable on

[7] Without no doubt, these institutional variables may have an effect on economic growth as well. We tried to use these variables in our growth regressions. However, since we obtained mixed results and the instrumentation of state aid and interaction terms was problematic we do not present these results.

[8] While the economic freedom index takes the values between 0 and 100 where higher values indicate more economic freedom, political stability index takes the values between -2.5 and +2.5. Since we use logarithmic forms of our variables we transformed this variable to range from 0 to 5. Similar to economic freedom index, higher values of this index indicate higher political stability. We also checked whether these indexes are stationary. According to the Fisher type Augmented Dickey-Fuller and Phillip-Perron Tests, both of these indexes are stationary. The results are available upon request.

[9] Undoubtedly, there is a risk of potential endogeneity of state aid, its subcomponents and the interaction terms between state aid and institutional variables in these regressions. Because of this risk, we instrumented these variables by using the first and second lagged values of these variables and reestimated our models with 2SLS. These instruments worked well for the regressions in which we use economic freedom as an institutional variable. Since the results of these regressions are almost identical to the results of the fixed effect OLS

investment; while columns 5-8 show the effects of one period lagged values of these variables on investment. The current values of economic freedom have a statistically significant and positive effect on investment. The one period lagged value of this variable is also significant and has a positive effect at the 10% level when we estimate the model with total state aid and horizontal state aid variables (columns 5 and column 7). However, except state aid to industry and services, none of the state aid variables has a statistically significant effect on investment and state aid to industry and services affects investment negatively.

Table 8 shows the effects of state aid and its subcomponents on investment when we use political stability as an institutional variable. According to the results, both the current and lagged values of political stability have a statistically significant and positive effect on investment. The effects of state aid and its subcomponents are similar to the results presented in Table 7. Once again, none of the state aid variables has a statistically significant effect on investment except state aid to industry and services and this variable affects investment negatively. However, in contrast to the results of the regressions in which economic freedom is used as an institutional variable[10], the interaction terms between total state aid, state aid to industry and services and political stability is statistically significant and has a positive effect on investment. These results indicate that state aid may affect investment positively if and only if political stability is ensured. Hence, the stability of the political environment is one of the fundamental elements with regard to the success of state aid policy.

7. CONCLUSIONS

In this study, we investigate the effects of state aid on economic growth and investment in 27 European Union countries over the period 1992-2011. In order to examine the effects of state aid policy on economic growth, we draw on total state aid and its various subcomponents. To account for the potential endogeneity of state aid, we use instrumental variables and 2SLS in addition to OLS.

Our findings suggest that neither state aid nor its subcomponents are effective in fostering economic growth. Although horizontal state aid is statistically significant with regard to OLS results its sign is negative and the size of its effect is very close to zero.

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estimations we do not present them here. However, these instruments did not work for the regressions in which we use political stability as an institutional variable. For this reason, we should be cautious about interpreting the results of the regressions in which political stability is used as an institutional variable. The 2SLS estimation results for the regressions in which economic freedom is used as an institutional variable are available upon request.

[10] In these regressions none of the interaction terms between state aid, its subcomponents and economic freedom is statistically significant.

The results of the regressions in which investment is the dependent variable are similar to the results of the growth regressions. Except state aid to industry and services, none of the state aid variables has a statistically significant effect on investment and state aid to industry and services affects investment negatively. However, both economic freedom and political stability have a positive and statistically significant effect on investment. Furthermore, the results indicate that total state aid and state aid to industry and services may affect investment positively if the political environment is stable. Yet, these results need further investigation because of the potential endogeneity of state aid variables.

When we consider all of these results, we conclude that state aid is not an effective tool in terms of economic growth and investment in the European Union countries. Thus, both the national governments and the European Commission should take necessary steps to rationalize state aid policy and to prevent the waste of government resources.

REFERENCES

Aghion, P., Boulanger, J., Cohen, E., (2011) "Rethinking Industrial Policy", **Bruegel Policy Brief**, Issue: 2011-04, http://www.bruegel.org/publications/publication-detail/publication/566-rethinking-industrial-policy, 30.01.2014.

Bianchi, P., Labory S. (2011) **Industrial Policy after the Crisis Seizing the Future**, UK, Edward Elgar Publishing.

Blomquist, S., Dahlberg, M. (1999) "Small Sample Properties of Liml and Jackknife IV Estimators: Experiments with Weak Instruments", **Journal of Applied Econometrics**, Volume: 14, Issue: 1, pp.69-88.

Bronzini, R., De Blasio, G. (2006) "Evaluating the Impact of Investment Incentives: The Case of Italy's Law 488/1992", **Journal of Urban Economics**, Volume: 60, Issue: 2, pp.327-349.

Choi, I. (2001) "Unit Root Tests for Panel Data", **Journal of International Money and Finance**, Volume: 20, Issue: 2, pp.249-272.

Curiscuolo, C., Martin, R., Overman, H., Van Reenen, J. (2012) "The Casual Effects of an Industrial Policy", **NBER Working Paper**, Working Paper No: 17842, www.nber.org, 01.12.2013.

David, P. A. (1985) "Clio and the Economics of QWERTY", **The American Economic Review**, Volume: 75, No: 2, pp.332-337.

European Commission (2005) "State Aid Action Plan, Less and better targeted state aid: a roadmap for state aid reform 2005–2009", http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52005DC0107:EN:NOT, 01.01.2014.

European Commission (2010) "An Integrated Industrial Policy for the Globalisation Era Putting Competitiveness and Sustainability at Centre Stage", **Communication from the Commission to the European Parliament, The Council, The European Economic and Social Committee and the Committee of the Regions**, www.ec.europa.eu, 26.01.2014.

European Commission (2013) State Aid Overview, http://ec.europa.eu/competition/state_aid/overview/index_en.html, 01.02.2014.

European Commission (2013) European Union State Aid Scoreboard, http://ec.europa.eu/competition/state_aid/scoreboard/non_crisis_en.html, 01.10.2013.

European Commission (2013) Annual Macro-economic Database-AMECO, http://ec.europa.eu/economy_finance/ameco/user/serie/SelectSerie.cfm, 01.10.2013.

European Union (2008) Consolidated Version of the Treaty on the Functioning of the European Union, **Official Journal of the European Union**, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52005DC0107:EN:NOT, 01.02.2014.

Evenett, S. J. (2003) "Study on Issues Relating to a Possible Multilateral Framework on Competition Policy", **Working Group on the Interaction between Trade and Competition Policy**, World Trade Organization (WTO), www.wto.org, 26.01.2014.

Fidrmuc, J. (2008) "Money Cant't Buy Me Growth: Making Change Happen in Post-Communist Countries?", **Seoul Journal of Economics**, Volume: 21, No: 3, pp.427-452.

Gobillon, L., Magnac, T., Selod, H. (2012) "Do Unemployed Workers Benefit from Enterprise Zones: the French Experience", **IZA Discussion Papers**, Discussion Paper No: 8084, http://ftp.iza.org/dp6357.pdf, 02.01.2014.

Gual, J., Jodar-Rosell, S. (2006) "Vertical Industrial Policy in the European Union: An Empirical Analysis of the Effectiveness of State Aid", **"La Caixa" Economic Papers**, No: 1, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1019223&download=yes, 01.07.2013.

Heritage Foundation, Economic Freedom Index, http://www.heritage.org/index/, 01.10.2013.

Hölscher, J., Nulsch, N., Stephan, J. (2010) "State Aid in the Enlarged European Union An Overview", **IWH Discussion Papers**, No: 24, pp.1-37.

Kassim, H., Lyons, B. (2013) "The New Political Economy of EU State Aid Policy", **Journal of Industry, Competition and Trade**, Volume: 13, Issue: 1, pp.1-21.

Legarda, A., Blazquez, J. (2013): "Why Western Nations Need an Active Industrial Policy? An Analysis of Deindustrialization and External Imbalances Europe", **ESADEgeo Position Paper**, Paper No: 31, http://www.esadegeo.com/position-papers, 01.02.2014.

Maddala, G. S., Wu, S. (1999) "A Comparative Study of Unit Root Tests with Panel Data and a New Simple Test", **Oxford Bulletin of Economics and Statistics**, Special Issue, pp.631-652.

Martin, P., Mayer, T., Mayneris, F. (2011) "Public Support to Clusters: A Firm Level Study of French Local Productive Systems", **Regional Science and Urban Economics**, Volume: 41, Issue: 2, pp.108-123.

Pack, H., Saggi, K. (2006) "Is There a Case for Industrial Policy? A Critical Survey", **The World Bank Research Observer**, Volume: 21, No: 2, pp.267-297.

Rodriguez-Clare, A. (2007) "Clusters and Comparative Advantage: Implications for Industrial Policy", **Journal of Development Economics**, Volume: 82, pp.43-57.

Rodrik, D. (2008) "Normalizing Industrial Policy", **Commission on Growth and Development Working Paper Series**, Working Paper No: 3, The World Bank, http://213.154.74.164/invenio/record/18465/files/rodrikter.pdf, 26.01.2013.

Schaffer, M. E. (2010) "xtivreg2: Stata module to perform extended IV/2SLS, GMM and AC/HAC, LIML and k-class regression for panel data models", http://ideas.repec.org/c/boc/bocode/s456501.htm, 15.12.2013.

Stock, J., Yogo, M. (2005) "Testing for Instruments in Linear IV Regression", in: Andrews DWK **Identification and Inference for Econometric Models**. New York, Cambridge University Press, pp. 80-108.

Stöllinger, R., Holzner, M. (2013) "State Aid and Export Competitiveness in the EU", **WIIW Working Papers**, No: 106, http://wiiw.ac.at/state-aid-and-export-competitiveness-in-the-eu-p-3092.html, 01.01.2014.

Warwick, "Beyond Industrial Policy: Emerging Issues and New Trends", **OECD Science, Technology and Industry Policy Papers**, No: 2, OECD Publishing, http://dx.doi.org/10.1787/5k4869clw0xp-en, 01.12.2013.

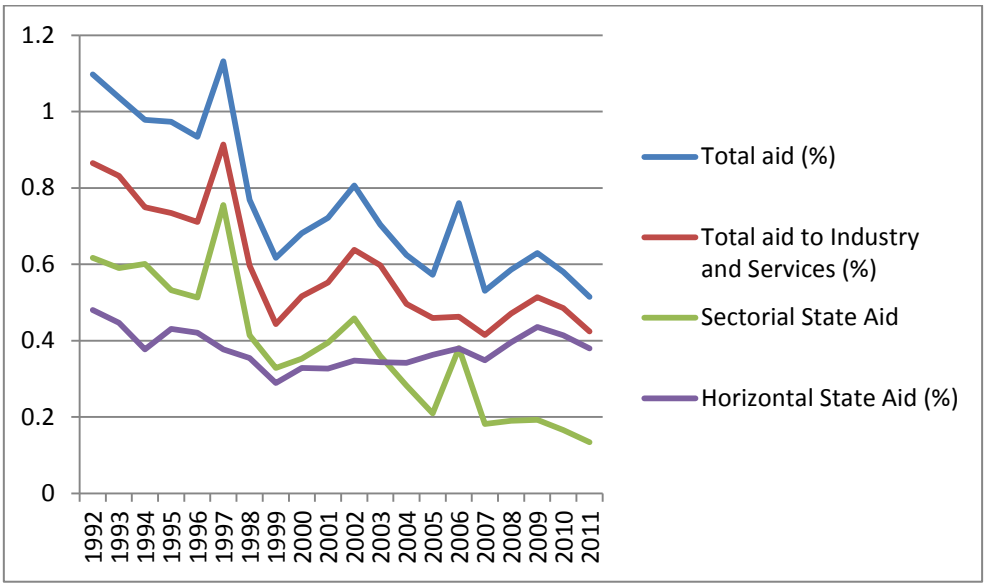
World Bank (2013) Worldwide Governance Indicators, www.govindicators.org.

Wren, C., Taylor, J. (1999) "Industrial Restructuring and Regional Policy", **Oxford Economic Papers**, Volume: 51, Issue: 3, pp.487-516.

Table 1: Descriptive Statistics

	Observation	Mean	Standard Deviation	Minimum	Maximum
Value Added Growth (per capita)	525	0.0213	0.0387	-0.1775	0.1181
Investment/GDP	532	-1.4426	0.1896	-2.2443	-0.8925
Population Growth	540	-2.7818	0.1584	-4.6402	-2.4422
Total State Aid	428	-4.8612	0.6726	-6.9730	-3.0727
State Aid to Ind.	428	-5.2883	0.8080	-7.6009	-3.0791
Horizontal State Aid	428	-5.8212	1.9956	-44.5437	-4.1387
Sectorial State Aid	428	-5.9145	3.1537	-41.5794	-3.1156
Lagged Total State Aid	401	-4.8479	0.6728	-6.9730	-3.0727
Lagged State Aid to Ind.	401	-5.2803	0.8114	-7.6009	-3.0791
Lagged Horizontal State Aid	401	-5.8403	2.0533	-44.5437	-4.1387
Lagged Sectorial State Aid	401	-5.8897	3.2482	-41.5794	-3.1156
Economic Freedom Index	450	4.1925	0.1128	3.7588	4.4140
Political Stability Index	351	1.1880	0.1388	0.7021	1.4274
Lagged Economic Freedom In.	423	4.1895	0.1141	3.7588	4.4140
Lagged Political Stability In.	324	1.1891	0.1399	0.7021	1.4274

Figure 1: Total State Aid and Its Main Subcomponents as a Percentage of GDP (EU-27)*



* State aid figures do not include aid that is provided due to the 2008 financial crisis.
Source: State Aid Scoreboard of the European Commission and AMECO.

Table 2: The State Aid Expenditures of Member Countries as a Percentage of GDP

	total state aid	state aid to industry and services	horizontal state aid	sectorial state aid
Austria	0.75	0.44	0.41	0.35
Belgium	0.56	0.43	0.36	0.19
Bulgaria	0.41	0.21	0.12	0.29
Cyprus	1.71	1.28	0.56	1.09
Czech Republic	1.53	1.39	0.52	1.01
Denmark	0.86	0.68	0.65	0.21
Germany	1.18	1.07	0.63	0.55
Spain	0.83	0.69	0.31	0.52
Estonia	0.26	0.11	0.11	0.15
Greece	0.85	0.57	0.53	0.32
France	0.95	0.65	0.38	0.56
Finland	1.68	0.45	0.43	1.25
Ireland	0.93	0.53	0.32	0.61
Hungary	1.71	1.41	0.76	0.96
Italy	0.80	0.63	0.53	0.27
Luxembourg	0.42	0.26	0.26	0.16
Lithuania	0.53	0.28	0.17	0.36
Latvia	1.01	0.42	0.34	0.66
Malta	3.03	2.79	0.23	2.81
Netherlands	0.48	0.23	0.22	0.26
Portugal	1.70	1.48	0.31	1.38
Poland	1.15	0.95	0.44	0.71
Romania	1.31	1.02	0.22	1.08
Sweden	0.76	0.61	0.58	0.15
Slovenia	0.92	0.69	0.57	0.35
Slovakia	0.60	0.52	0.38	0.22
United Kingdom	0.30	0.21	0.17	0.13

Source: State Aid Scoreboard of the European Commission and AMECO.

Table 3: Unit Root Test Results

	Aug.Dickey-Fuller (Inverse χ^2 Stat.)	Philips-Perron (Inverse χ^2 Stat.)
Value Added Growth (per capita)	129.771***	147.730***
Gross Fixed Cap. Formation	85.2292**	76.6044**
g+n+δ	68.4552*	27.6638
Total State Aid	77.3416**	80.1780**
State Aid to Ind. and Services	69.1510*	74.3061**
Horizontal State Aid	82.2164***	108.789***
Sectorial State Aid	104.500***	134.385***
Lagged Total State Aid	71.7042**	79.5669**
Lagged State Aid to Ind. and Services	67.5195*	69.1707*
Lagged Horizontal State Aid	73.7582**	113.153***
Lagged Sectorial State Aid	94.1271***	123.998***

Note: ***, **, * indicates $p<0.01$, $p<0.05$, $p<0.10$ respectively. All tests are calculated with an intercept and a time trend. Lag length is selected according to Akaike Information Criterion.

Table 4: The Effects of Total State Aid, State Aid to Industry and Services, Horizontal State Aid and Sectorial State Aid on Economic Growth (FE OLS Estimations)

Dependent Variable: Output Growth (per capita)	(1) Total State Aid	(2) State Aid to Ind. and Services	(3) Horizontal State Aid	(4) Sectorial State Aid	(5) Total State Aid	(6) State Aid to Ind. and Services	(7) Horizontal State Aid	(8) Sectorial State Aid
Gross Fixed Cap. Formation	0.0559***	0.0566***	0.0564***	0.0569***	0.0611**	0.0623***	0.0621***	0.0616***
	(0.0189)	(0.0192)	(0.0189)	(0.0191)	(0.0220)	(0.0218)	(0.0219)	(0.0217)
g+n+δ	-0.0427***	-0.0420***	-0.0426***	-0.0417***	-0.0408***	-0.0405***	-0.0405***	-0.0400***
	(0.0084)	(0.0091)	(0.0089)	(0.0086)	(0.0033)	(0.0089)	(0.0087)	(0.0085)
Total State Aid/GDP	-0.0030							
	(0.0044)							
State Aid to Ind. and Services/GDP		0.0005						
		(0.0039)						
Horizontal State Aid/GDP			-0.0004*					
			(0.0002)					
Sectorial State Aid/GDP				-0.0009***				
				(0.0001)				
Lagged Total State Aid/GDP					-0.0042			
					(0.0033)			
Lagged State Aid to Ind. and Services/GDP						0.0005		
						(0.0030)		
Lagged Horizontal State Aid/GDP							-0.0001	
							(0.0003)	
Lagged Sectorial State Aid/GDP								-0.0005***
								(0.0001)
Constant	-0.0345	-0.0146	-0.0222	-0.0215	-0.0309	-0.0059	-0.0099	-0.0113
	(0.0456)	(0.0522)	(0.0431)	(0.0432)	(0.0462)	(0.0514)	(0.0452)	(0.0460)
F Test	179.33	96.41	180.54	258.97	69.92	53.68	79.60	146.08
R^2	0.6501	0.6491	0.6496	0.6539	0.6569	0.6550	0.6550	0.6565
R^2-Within	0.5933	0.5922	0.5927	0.5978	0.6057	0.6036	0.6036	0.6053
R^2-Adjusted	0.6057	0.6046	0.6051	0.6100	0.6112	0.6091	0.6091	0.6108

Note: ***, **, * indicates p<0.01, p<0.05, p<0.10 respectively. Standard errors are in parenthesis. All regressions include individual and time effects and are estimated by using robust standard errors.

Table 5: The Effects of Total State Aid and State Aid to Industry and Services on Economic Growth (Instrumental Variable Estimations)

Dependent Variable: Output Growth (per capita)	**Total State Aid**			**State Aid to Industry and Services**		
	(1) (first stage) (2sls)	**(2) (second stage) (2sls)**	**(3) (second stage) (liml)**	**(4) (first stage) (2sls)**	**(5) (second stage) (2sls)**	**(6) (second stage) (liml)**
Gross Fixed Cap. Formation	-0.2682	0.0555***	0.0555***	-0.9731***	0.0453***	0.0448***
	(0.2682)	(0.0154)	(0.0162)	(0.3202)	(0.0167)	(0.0170)
g+n+δ	-0.2666*	-0.0459***	-0.0461***	-0.1582	-0.0439***	-0.0439***
	(0.1484)	(0.0110)	(0.0110)	(0.1863)	(0.0114)	(0.0114)
Total State Aid/GDP		-0.0164	-0.0175			
		(0.0148)	(0.0162)			
State Aid to Ind. and Services/GDP					-0.0146	-0.0153
					(0.0116)	(0.0122)
Excluded Instruments						
Lagged Social Protection	-0.7532***			-0.8628**		
	(0.2745)			(0.3407)		
Lagged Health	0.8143***			1.2756***		
	(0.2818)			(0.3995)		
Lagged Public Order Safety	-0.5142***			-0.5685***		
	(0.1861)			(0.2124)		
Angrist-Pischke						
Chi Square (Underidentification)	22.83			19.67		
p-value	(0.0000)			(0.0002)		
F-Test (Weak Instrument)	7.13			6.14		
Kleinbergen-Paap						
Chi Square (Underidentification)		19.52	19.52		18.65	18.65
p-value		(0.0002)	(0.0002)		(0.0003)	(0.0003)
F-Test (Weak Instrument)		7.13	7.13		6.14	6.14
Cragg-Donald						
Wald F Statistic						
(Weak Instrument)		8.581	8.581		10.90	10.90
Endogenity of Instruments (C Test)		1.258	1.258		2.529	2.529
p-value		(0.2620)	(0.2620)		(0.1118)	(0.1118)
Hansen J Statistic		1.556	1.552		0.937	0.935
p-value		0.4594	0.4603		0.6258	0.6266
C-Statistic$_{socialprotection}$		0.003	0.002		0.001	0.001
p-value		0.9555	0.9613		0.9804	0.9787
C-Statistic$_{health}$		0.966	0.965		0.383	0.383
p-value		0.3258	0.3260		0.5358	0.5359
C-Statistic$_{publicordersafetv}$		0.876	0.883		0.762	0.761
p-value		0.3492	0.3473		0.3828	0.3829
F-Test	4.45	10.74	10.66	2.68	10.17	10.09
Centered-R^2	0.1866	0.5802	0.5765	0.1766	0.5588	0.5554

Note: ***, **, * indicates p<0.01, p<0.05, p<0.10 respectively. Standard errors are in parenthesis. All regressions include individual and time effects and are estimated by using robust standard errors.

Table 6: The Effects of Horizontal State Aid and Sectorial State Aid on Economic Growth (Instrumental Variable Estimations

Dependent Variable: Output Growth (per capita)	**Horizontal State Aid**			**Sectorial State Aid**		
	(1) (first stage) (2sls)	**(2) (second stage) (2sls)**	**(3) (second stage) (liml)**	**(4) (first stage) (2sls)**	**(5) (second stage) (2sls)**	**(6) (second stage) (liml)**
Gross Fixed Cap. Formation	-0.6449**	0.0563***	0.0563***	1.3181	0.0557***	0.0543***
	(0.2814)	(0.0150)	(0.0150)	(1.8804)	(0.0152)	(0.0161)
g+n+δ	-0.8371*	-0.0453***	-0.0454***	0.4444	-0.0433***	-0.0440***
	(0.2551)	(0.0125)	(0.0130)	(0.8147)	(0.0116)	(0.0120)
Horizontal State Aid/GDP		-0.0036	-0.0038			
		(0.0115)	(0.0130)			
Sectoral State Aid/GDP					0.0013	0.0029
					(0.0033)	(0.0059)
Excluded Instruments						
Lagged Social Protection	-1.4470***			1.2951		
	(0.3111)			(1.5052)		
Lagged Health	-0.0666			0.7041		
	(0.843)			(1.2577)		
Lagged Public Order Safety	-0.3698*			-3.7717**		
	(0.2143)			(1.5817)		
Angrist-Pischke						
Chi Square (Underidentification)	30.00			9.41		
p-value	(0.0000)			(0.0243)		
F-Test (Weak Instrument)	9.37			2.94		
Kleinbergen-Paap						
Chi Square (Underidentification)		28.46	28.46		10.00	10.00
p-value		(0.0000)	(0.0000)		(0.0186)	(0.0186)
F-Test (Weak Instrument)		9.37	9.37		2.94	2.94
Cragg-Donald						
Wald F Statistic						
(Weak Instrument)			12.05		2.89	2.89
Endogenity of Instruments (C Test)		0.075	0.075		0.022	0.022
p-value		(0.7844)	(0.7844)		(0.8831)	(0.8831)
Hansen J Statistic		3.326	3.307		3.481	3.252
p-value		0.1896	0.1914		0.1754	0.1967
C-Statistic$_{socialprotection}$		0.374	0.373		0.115	0.156
p-value		0.5409	0.5413		0.7347	0.6925
C-Statistic$_{health}$		2.800	2.782		3.213	2.986
p-value		0.0942	0.0954		0.0731	0.0840
C-Statistic$_{publicordersafety}$		0.140	0.137		3.158	2.948
p-value		0.7079	0.7117		0.0755	(0.0860)
F-Test	2.38	11.13	11.13		10.64	10.06
Centered-R^2	0.1940	0.5971	0.5969		0.5701	0.5082

Note: ***, **, * indicates p<0.01, p<0.05, p<0.10 respectively. Standard errors are in parenthesis. All regressions include individual and time effects and are estimated by using robust standard errors.

Table 7: The Effects of State Aid and Its Subcomponents on Investment (Institutional Variable: Economic Freedom)

Dependent Variable: Gross Fixed Cap. Formation	(1) Total State Aid	(2) State Aid to Ind.	(3) Horizontal State Aid	(4) Sectorial State Aid	(5) Total State Aid	(6) State Aid to Ind.	(7) Horizontal State Aid	(8) Sectorial State Aid
Total State Aid/GDP	-0.0186							
	(0.0215)							
State Aid to Ind. and Services/GDP		-0.0439**						
		(0.0207)						
Horizontal State Aid/GDP			-0.0200					
			(0.0144)					
Sectorial State Aid/GDP				0.0010				
				(0.0048)				
Economic Freedom	0.6648**	0.6407**	0.7023**	0.6739**				
	(0.2923)	(0.2675)	(0.2832)	(0.2854)				
Total State Aid·Eco. Freedom	0.0876							
	(0.1936)							
State Aid to Ind.·Eco. Freedom		0.0522						
		(0.1333)						
Horizontal State Aid·Eco.Freedom			-0.2620					
			(0.1918)					
Sectorial State Aid·Eco.Freedom				0.0011				
				(0.0383)				
Lagged Total State Aid/GDP					-0.0255			
					(0.0246)			
Lagged State Aid to Ind./GDP						-0.0353*		
						(0.0195)		
Lagged Hor. State Aid/GDP							-0.0134	
							(0.0197)	
Lagged Sectorial State Aid/GDP								-0.0004
								(0.0049)
Lagged Economic Freedom					0.4971*	0.4186	0.5027*	0.4785
					(0.2922)	(0.2575)	(0.2896)	(0.2899)
Lagged Total State Aid·Eco. Freedom					0.0354			
					(0.2226)			
Lagged State Aid to Ind.·Eco. Freedom						0.1463		
						(0.1095)		
Lagged Hor. State Aid·Eco.Freedom							-0.1930	
							(0.2812)	
Lagged Sectorial State Aid·Eco.Freedom								-0.0037
								(0.0373)
Constant	-1.4753***	-1.4758***	-1.4907***	-1.4836***	-1.4577***	-1.4574***	-1.4691***	-1.4663***
	(0.0284)	(0.0305)	(0.0351)	(0.0297)	(0.0294)	(0.0283)	(0.0335)	(0.0296)
F Test	12.09	9.67	11.31	13.60	9.46	8.23	15.48	22.54
R^2	0.7275	0.7386	0.7298	0.7255	0.7327	0.7406	0.7319	0.6923
R^2-Within	0.4101	0.4342	0.4151	0.4057	0.4109	0.4282	0.4090	0.4043
R^2-Adjusted	0.6918	0.7044	0.6944	0.6895	0.6957	0.7047	0.6948	0.7297

Note: ***, **, * indicates p<0.01, p<0.05, p<0.10 respectively. Standard errors are in parenthesis. All regressions include individual and time effects and are estimated by using robust standard errors.

Table 8: The Effects of State Aid and Its Subcomponents on Investment (Institutional Variable: Political Stability)

Dependent Variable: Gross Fixed Cap. Formation	(1) Total State Aid	(2) State Aid to Ind.	(3) Horizontal State Aid	(4) Sectorial State Aid	(5) Total State Aid	(6) State Aid to Ind.	(7) Horizontal State Aid	(8) Sectorial State Aid
Total State Aid/GDP	-0.0057							
	(0.0215)							
State Aid to Ind. and Services/GDP		-0.0326*						
		(0.0191)						
Horizontal State Aid/GDP			-0.0244					
			(0.0207)					
Sectorial State Aid/GDP				-0.0040**				
				(0.0015)				
Political Stability	0.4214***	0.3227**	0.4190***	0.6568***				
	(0.1270)	(0.1278)	(0.1412)	(0.0743)				
Total State Aid·Pol. Stability	0.2424**							
	(0.1171)							
State Aid to Ind.·Pol. Stability		0.2400**						
		(0.0955)						
Horizontal State Aid·Pol. Stability			0.0334					
			(0.1066)					
Sectorial State Aid·Pol. Stability				0.0767				
				(0.0743)				
Lagged Total State Aid/GDP					-0.0105			
					(0.0271)			
Lagged State Aid to Ind./GDP						-0.0107		
						(0.0209)		
Lagged Hor. State Aid/GDP							-0.0166	
							(0.0223)	
Lagged Sectorial. State Aid/GDP								0.0008
								(0.0037)
Lagged Political Stability					0.4585***	0.6239***	0.4419***	0.7084***
					(0.1137)	(0.1523)	(0.1360)	(0.1295)
Lagged Total State Aid·Pol. Stability					0.2318*			
					(0.1137)			
Lagged State Aid to Ind.·Pol. Stability						0.2112*		
						(0.1092)		
Lagged Hor. State Aid·Pol. Stability							0.0654	
							(0.1234)	
Lagged Sectorial State Aid·Pol. Stability								0.0832
								(0.0866)
Constant	-1.4879***	-1.4771***	-1.4846***	-1.4382***	-1.4611***	-1.4616***	-1.4604***	-1.4702***
	(0.0227)	(0.0244)	(0.0249)	(0.0171)	(0.0273)	(0.0188)	(0.0277)	(0.0112)
F Test	13.85	14.11	10.73	13.58	13.18	16.05	9.46	8.28
R^2	0.7285	0.4572	0.7240	0.7623	0.7448	0.7741	0.7391	0.7666
R^2-Within	0.4311	0.7410	0.4217	0.5004	0.4621	0.5251	0.4502	0.5094
R^2-Adjusted	0.6892	0.7035	0.6840	0.7194	0.7050	0.7333	0.6985	0.7245

Note: ***, **, * indicates p<0.01, p<0.05, p<0.10 respectively. Standard errors are in parenthesis. All regressions include individual and time effects and are estimated by using robust standard errors.