Scenarios of Macro-economic Development for Catalonia on Horizon 2030

"Economic effects of a potential secession of Catalonia from Spain and paths for integration with the EU". Final Report

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The research has been conducted from October 2013 to May 2015 by a consortium of four leading research centers and think tanks[1]:

CIDOB, **Barcelona Centre for International Affairs**, is a Catalan think-tank founded in 1973 dedicated to research and divulge contents of the different areas of International Relations, European and Mediterranean politics, Security and Development studies. CIDOB is a **public foundation** with a Board of Trustees that includes among its members the main political institutions and universities of the country.

Istituto di Studi per l'Integrazione dei Sistemi (ISIS, Italy)
ISIS - the Institute of Studies for the Integration of Systems (www.isis-it.com) - is an Italian private research and consulting firm supporting international, national and local public bodies for the analysis, the design, the implementation and the evaluation of sustainable policies in the fields of energy, environment, transport and mobility, urban planning, and knowledge society. For more than four decades ISIS has supplied expertise and solved complex problems for a variety of public and private organisations, and notably for the European Commission. Founded in 1971, ISIS relies on the expertise of a multi-disciplinary team – including engineers, statisticians, experts in information technology, social scientists, and economists – and avails itself of state-of-the-art information technologies, also developing its own interactive and user-friendly software applications. ISIS has extensive experience in the management of and participation in EU funded projects in FP4, FP5, FP6 and FP7, and has a well-established network of alliances currently active in Europe and beyond.

E3-Modelling. Energy, Economy & Environment (E3M, Greece)
E3-Modelling is a research entity offering policy analysis studies and consulting services worldwide. E3-Modelling research team has developed large scale applied models, undertakes policy assessment in the fields of macroeconomic growth, energy system and markets, climate change policy, transport sector and provides services to clients on policy analysis and consulting using the models. The suite of models developed and maintained by E3-Modelling include global and

1. This study has been carried out as a joint research project by CIDOB and CEPS with the participation of ISIS and ICCS according to the Cooperation Agreement between CIDOB and CEPS (Centre for European Policy Studies) signed on November 8th 2013

EU-specific multi-sectoral macroeconomic models, detailed partial equilibrium models for the transport and power generation sectors as well as sector specific models on agriculture, biomass and biofuels. E3-Modelling develops and maintains several sector-specific models. The energy model developed and maintained for all the European Union member-states and all the European countries non-members of the EU is PRIMES. For the transport sector the PRIMES-TREMOVE transport model has been developed and it is maintained for all 28 EU Member States. E3-Modelling researchers developed and maintain the PROMETHEUS world energy model, a stochastic world energy/ technology model rich in representation of world oil and gas markets. E3-Modelling develops and operates the GEM-E3 model a multiple-country and multiple-sectors detailed computable general equilibrium model with global coverage which covers the interactions between the economy, energy and the environment. The GEM-E3 model operates in the European Commission and it is the most widely used CGE model in Europe. GEM-E3 model versions have been tailored to region-specific or policy-specific assessment. E3-Modelling has developed and maintains with regular updates a considerable database on the economies represented in the GEM-E3 model including social accounting, bilateral trade, and consumption and investment matrices and energy data. The key personnel of E3-Modelling have assisted institutions in developing their own models and using such models in policy analysis.

Centre for European Policy Studies, CEPS, Belgium. Founded in Brussels in 1983, CEPS is among the most experienced and authoritative think tanks operating in the European Union. Its most distinguishing feature lies in its strong in-house research capacity, complemented by an extensive network of partner institutes throughout the world. CEPS also serves as a leading forum for debate among all stakeholders in the European policy process.

The research team is composed of a group of international economists:

Prof. Rym Ayadi is the research director of the project, Professor at HEC Montreal (since July 2013), Director of the International Research Institute on Cooperatives (http://institutcoop.hec.ca/en/) and of the International Research Centre on Cooperative Finance (http://financecoop.hec.ca/en/) (since October 2014). She is also President of the Euro-Mediterranean Economists Association (EMEA) (http://www.euromed-economists.org). Till October 2014, she was Senior Research Fellow and Head of Research of the Financial Institutions Unit at CEPS. She also served as the Director of MedPro (Mediterranean Prospects), a 3 million€-EU funded consortium to Think Ahead for the Mediterranean and the Euro- Mediterranean Partnership". (www.medpro-foresight.eu).

Carlo Sessa, former President of ISIS, now Research Director – Before joining ISIS in 1983, he has conducted research at NYU, where he worked with Nobel Prize winner Wassily Leontieff. He was the Coordinator of several EU research projects, in the 5th, 6th and 7th Framework Programmes, in the fields of transport, urban issues and environment. In this context, he organised several participatory foresight exercises, involving panels of experts and citizens.

Riccardo Enei graduated in Political Science, has been working in ISIS as researcher since 1990. He is specialised in the field of economic research, environmental impacts and information systems for socio economic data analysis.

Prof. Pantelis Capros is President of E3-Modelling and a Professor of Energy Economics and Operation Research at the Department of Electrical and Computer Engineering of National Technical University of Athens. He has built and used a variety of large-scale mathematical models and has more than 20 years professional experience of consultancy in the domain of energy, transport, environment and economic policy. He has served as consultant to the European Commission, several European Governments and energy companies. He has built and used a variety of large-scale mathematical models. He has widely published (more than 100 publications) in the areas of Energy Modelling, Macroeconomics, Operations Research and Mathematical Programming.

Dr. Leonidas Paroussos is managing director of E3-Modelling. He has extensive experience in the development and use of large scale applied models and applied research focusing in the fields of economy, energy and the environment. He has extensive experience in modelling, particularly in the development of the GEM-E3 model. He has participated in several research and policy oriented projects. He is a main contributor in introducing bottom-up modules in the global version of the GEM-E3 model and he is experienced in climate change policy assessment using general equilibrium models, environmental economics, energy economics and transport analysis. He is publishing regularly in a variety of journals including Energy Economics, Energy Policy, Complexity Economics and Economic Letters.

Dr. Kostas Fragkiadakis is working in the field of CGE model development and policy applications. His research experience includes works with the Department of Economics at the National and Kapodistiran University of Athens and the National Technical University of Athens, Greece in the areas of Energy Analysis, Computational Statistics, Econometrics, Computable General Equilibrium, Statistics and Finance, Bayesian methods and Non Parametric Statistics. He has published in the areas of Mathematical Modelling, Statistical Methodology, Computational Statistics, General Equilibirum Modelling and Energy Studies.

Dr. Stella Tsani is a researcher working with the development of CGE models. Her research interests focus on resource economics, development economics, political economy and macroeconomics. She is a member of the Centre for Euro Asian Studies at the University of Reading, UK and the Observatory for Energy, Technology and Infrastructure in Argentina. She has held research posts at Europrism, Cyprus, at the Public Finance Monitoring Centre in Azerbaijan and at the Institute of Energy for South East Europe, Greece. She has worked for the UK Foreign Office Chevening Fellowship Program in Energy Economics hosted by the University of Reading. Her research has been published in peer reviewed journals including Energy Economics and Resources Policy.

Marc Gafarot, Holds a degree in Humanities from the Universidad de Navarra, an MSc in European Studies from the London School of Economics and Political Science and conducts research in the field

of International Processes of Secession and International Cooperation at CIDOB. As a journalist and political commentator he has worked from London for Bloomberg LP, in Latin America for Summit Communications and served as a Parliamentary Adviser at the European Parliament in Brussels and Strasbourg. Marc Gafarot has also worked from Barcelona as Head of International Relations for Fundació CATmón and for the English-written magazine Catalan International View. He has written a book on Flanders and Federalism in Belgium called "La mort de Bèlgica? La gradual i pacífica emancipació flamenca" (The Death of Belgium? the Gradual and Peaceful Flemish Emancipation) and he has co-authored "The Student's Guide to European Integration", "Benefits of being a small state in the EU" and his last book is called "Hem Guanyat / Hem perdut: victòria o derrota de Catalunya". He collaborates with a number of Catalan and international publications and has published works on Political Science, Nationalism, Immigration, European and world politics.

Unless otherwise indicated, the views expressed are attributable only to the authors in a personal capacity and not to any institution with which they are associated.

1. EXECUTIVE SUMMARY

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Economically, secession can be motivated by several factors that have been documented in the literature. These can range from differences in policy preferences and, more generally, heterogeneity, the variation in the efficiency of redistribution and mutual insurance, and prospects for economies of scale in public-goods provision to the inter-regional differences in taxation effort and public-finance benefits of large jurisdictions versus the costs of political heterogeneity.

Till today, since its inception, the European Union and individual member states did not experience secession movements within its frontiers. 2014 was marked by massive mobilisations in Scotland and Catalonia, respectively seeking to secede from the UK and Spain. The result of the Scottish referendum rejected the separation from the UK while in Catalonia, political and legal quarrels continue with the government of Spain.

Several scenarios for future development of Catalonia with the rest of Spain and with the EU are simulated and assessed in a horizon 2030 in this study.

The "business as usual" scenario develops on a path where policies and trends observed in the recent past in Catalonia, Spain and the EU continue to prevail to 2030. Catalonia remains an autonomous community within Spain. Fiscal imbalances continue to be recorded up to 2030, thus Catalonia continues to record fiscal deficits similar to those recorded over the last years (8% of GDP).

Alternative options entail **changing the statu-quo of the relationship between Catalonia and Spain and/or of the whole European Union**.

As for the former, there are two possibilities: a negotiated independence process leading to a smooth transition of Catalonia from being an autonomous community of Spain – on the same legal basis of the other communities in Spain – to become a new EU member state, or a unilateral process – not negotiated and not agreed with the government of Spain – leading to the secession of Catalonia from Spain. The unilateral seccession

may lead in practice to a discontinuity of EU membership for Catalonia, as the government of Spain will likely use its powers to veto any formal recognition of the new Catalonia state from the European Union.

As for the latter, a whole reform of the European Union is possible, pushed by factors that are obviously beyond the control of Spain and Catalonia. There are again two possibilities, i.e. that Catalonia contributes to the whole European Union reform as a new member state from within the Union itself – in case of a negotiated independence agreed with the government of Spain – or as a region of Spain with greater fiscal authonomy than today. Let guess in the latter case a form of autonomy for Catalonia analogue to that experienced currently by the Basque region – and therefore a greater influence on some specific regional matters (e.g. the EU cohesion policy where the contribution of Catalonia as wealthier region of Europe could be augmented). Finally, a last eventuality is for Catalonia to leave the EU after unilateral secession – discontinuity – and then influence from outside the process of EU reform, reducing among other things the veto powers of Spain or other member states to Catalonia's re-admission in the new EU.

These future options are assessed with a scenario building methodology drawing on the combination of **desk research**, **foresight qualitative and quantitative analyses** and **policy implications and recommendations**.

In view of the macro economic assessment of the scenarios of Catolonia as an independent state under mutual agreement or unilateral secession assumptions in horizon 2030, the study points to the macro-economic insustainablity of the status-quo scenario from growth and employment perspectives due to the high and sustained deficit of Catalonia.

In the short run uncertainty, high interest rates and a volatile investment environment triggered by the decision to secede is found to slow the Catalan GDP growth rate; the effect is more pronounced if the decision to secede is unilateral. However the structure of the Catalan economy and the pursuit of fiscal policy towards a balanced public budget can deliver higher than the reference GDP and employment growth rates, once the transition period to sovereignty is over.

The overall net effect from secession on the Catalan economy is the result of a multitude of short and long run adjustments with frequently opposing effects. The short-term effects stem from the positive changes in fiscal imbalances, improved domestic production and negative changes owing to uncertainty and risk factors that are difficult to quantifiy with firmness. The long term effects which rely largely on the capacity of the economy to adapt via increasing infrastructure capacity, which increases in turn economy-wide productivity and competiveness and effective public spending, while reducing uncertainty due to the strong economic fundamentals of the Catalan economy.

As expected Catalonia benefits more under mutual agreement on secession as the lower uncertainties and risks associated with secession in this case allow for a faster recovery of the economy from the shock of independence from Spain.

These conclusions favor a scenario for secession under mutual agreement between Catolonia and Spain and an orderly planning towards resolution as opposing to a scenario of unilateral secession. It thus reduces any uncertainty and risks which effects are detrimental to all parties.

The scenarios for cooperation of the new Catalan state with the European Union in its present institutional setting (status-quo), including forms of permanence or re-accession to the EU as well as possibilities for opting out and establishing new agreements with the EU from outside have been extensively discussed. Undoubtedly, options and possible legal procedures underpinning the mutual agreement scenario between both entities are equally prefered as it leads to smooth transition towards a new equilibrium.

A more long-term prospective normative scenario of European Union reform would change the game for both Spain and Catalonia negotiations. Such a scenario delineates schematically the evolution towards a desirable future, with the transformation of the Eurozone into a truly political and fiscal union, the "European Political Union (EPU)". This is assumed to unfold under the pressure of disruptive economic and geopolitical dynamics, of which we see already today several signals. In such new context, Catalonia could achieve the status of an independent Member State of the EPU either under the mutual agreement scenario or the unilateral scenario. However such a prospective analysis might be dismissed if the negotiations between Catalonia and Spain would resume in the short run.

2. INTRODUCTION

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The interest of the study of secession processes and its consequences in the international relations arena motivated this research launched by CIDOB in collaboration with CEPS, ISIS and ICCS, amidst the recent events that surfaced in Scotland, Catalonia and others towards independence. To date, none of the European Union countries have experienced a break-up of a part of its territory once they have joined the EU. 2014 marked a referendum in Scotland and massive citizen mobilisations in Catalonia on the independence question. In Scotland, the referendum, despite tight results, was in favour of rejecting secession. In Catalonia, as the independence alternative is gaining ground while political and legal quarrel between the national and regional governments continue, a full-fledged and informed economic assessment of the different scenarios is needed to devise the best policy options for future developments.

The study aims at identifying the scenarios of future development of Catalonia with the rest of Spain and cooperation with the European Union in particular:

- Discussing potential alternative scenarios for Catalonia in the event of becoming an independent state, as a consequence of new political developments and economic conditions at play in Spain in the next years, until 2030.
- Delivering a macro- economic assessment of the scenarios using a state of the art economic model.

The exercise provides to the policy makers an essential background that helps understanding the costs and benefits of different policy strategies in the years to come, and helps to detect the best circumstances that would help to shape a successful transition process in different independence scenarios from the point of view of:

- The Catalan economy and society, with evident benefits for the Catalan government, the citizens and business in the region in relation with the rest of Spain; and
- The cooperation with the European Union and the Member States – including obviously Spain after the secession.

Indeed, "a successful independence process" will require a peaceful transition to a new status quo where Catalonia would ideally hold the condition of "new" Member State in the European Union.

The situation (as of today) seems open to different scenarios and subject to the opposition of the Spanish government to the Catalonia's independence intentions. However, it is possible to imagine different futures until 2030, depending on possible game changers that might contribute to change the attitude of the different policy actors – and particular Spain and the European Union institutions – in a way that would prove to be eventually more favorable for Catalonia's independence, creating the circumstances for a smooth and quick transition process with no conflicts prospects.

The strategy of the study is therefore to consider and assess possible futures where both the status-quo of the Spain-Catalonia relationship (prevailing till the publication date of this study) and that of the whole European Institutions might change in the next decades, as schematized in the figure below:

Catalonia 2030 - Scenario options		
Catalonia in EU in Spain	European Union Status Quo	European Union Reformed
I. Spain-Catalonia Status Quo	"Business As Usual" without better fiscal balance (reference Scenario)	Catalonia contributes to the EU reform as autonomous region of Spain with a better fiscal balance
II. Negotiated Independence	Smooth Transition to a "new old" Catalan State membership ot the EU	Catalonia contributes to the EU reform as a "new-old" Member State
III. Non Negotiated Independence (Secession)	Discontinuity of EU memberchip	

Source: Authors natural resources

The reference "business as usual" scenario develops on a path where policies and trends observed in the recent past in Catalonia, Spain and the EU continue to prevail to 2030. Catalonia remains an autonomous community within Spain. Fiscal imbalances continue to be recorded up to 2030, thus Catalonia continues to record fiscal deficits similar to those recorded over the last years (8% of GDP).

Alternative options entail **changing the statu-quo of the relationships between Catalonia and Spain and/or of the whole European Union**.

As for the former, there are in principle two possibilities: a negotiated independence process leading to a smooth transition of Catalonia from being an autonomous community of Spain – on the same legal basis of the other communities in Spain – to become a new EU member state, or a unilateral process – not negotiated and not agreed with the government of Spain – leading to the secession of Catalonia from Spain. The unilateral seccession will lead in practice to a discontinuity of EU membership for Catalonia, as the government of Spain will likely use its powers to veto any formal recognition of the new Catalonia state from the European Union.

As for the latter, a whole reform of the European Union is possible, pushed by factors that are obviously beyond the control of both the government of Spain and the Catalan government. A possible new settlement of the European Union institutions is envisioned in chapter 4.2 of this study. There are again two possibilities, i.e. that Catalonia contributes to the whole European Union reform as a new member state from within the Union itself – in case of a negotiated independence agreed with the government of Spain – or as a region of Spain with greater fiscal authonomy than today. Let guess in the latter case a form of autonomy for Catalonia analogue to that experienced currently by the Basque region – and therefore a greater influence on some specific regional matters (e.g. the EU cohesion policy where the contribution of Catalonia as wealthier region of Europe could be augmented). Finally, a last eventuality is for Catalonia to leave the EU after unilateral secession – discontinuity – and then influence from outside the process of EU reform, reducing among other things the veto powers of Spain or other member states to Catalonia´s re-admission in the new EU.

These future options are assessed with a scenario building methodology drawing on the combination of **desk research**, **foresight qualitative and quantitative analyses** and **policy implications and recommendations**.

In practice, desk research has been conducted first to:

within the Union itself Compile an extensive database of economic and social indicators to feed the quantitative aspect of the research, working for this respect in conjunction with the official statistics department of Catalonia (www.idescat.cat), to ensure that all data used is reviewed and completed.

within the Union itself review the relevant historical, legal, and political aspects of Catalonia's self-determination, and the literature on the possible so-called "internal enlargement" of the European Union. The latter in particular to assess the legitimacy of withdrawal for any part of the territory of a Member State, with the new independent state continuing – possibly after a transition period to deal with necessary institutional adaptations – to be a member of the European Union.

In a second step, once the BAU/Reference scenario has been constructed, alternative scenarios have been elaborated[2] and their macro-economic impacts assessed using a CGE (general equilibrium) modeling framework. More in detail, the alternative scenarios simulated with the GEM-E3-CAT model are:

- **S01 - Catalonia's secession following mutual agreement with Spain** (i.e. the negotiated independence and smooth transition to membership of Catalonia in the EU directly as "new" member state mentioned in the table above).
- **S02 - Secession following unilateral decision of Catalonia** (i.e. the non-negotiated independence and discontinuity of membership of the new Catalan state that is no more associated to the EU, causing a challenging transition towards a new stabilized relationship with the EU – most probably a new form of agreement from outside as the Spanish veto is most probably deemed to block any attempt of re-accession[3])

2. Several stakeholders meetings have been organised during 2013 and 2014 to discuss the conceptual framework of this research.
3. This assumption holds on the basis of the Spanish resistence to independence talks of Catalonia in 2013 and 2014.

These two scenarios have been elaborated and the results are presented in Part I of this study, describing in detail:

- The basic theoretical approaches underpinning the analysis of secession and explaining its expected macro-economic impacts.
- The implications for Catalonia's secession and the most recent developments, in particular the evolution of the fiscal unbalance and other drivers of the Catalan economy (GDP growth, unemployment) as of 2014.
- The methodological approach and the modifications implemented in the GEM-E3-CAT modelling framework to represent the Catalan economy. In the new version model, Catalonia is represented as a separate national entity (which is a theoretical assumption based on the scenarios under investigation). Interdependences are shown with the rest of Spain, with key trade partners in the EU (Germany, France, Italy, Portugal and the rest of 28 EU member countries), with key trade partners in the world (China, Russian Federation and the other emergent countries) and finally with the rest of the world, including the US.
- The reference scenario, showing the expected evolution of GDP, employment and sectorial productions until 2030 in case of a prevailed status-quo.
- The two alternative scenarios, showing first the key assumptions which differentiate the two scenarios – about debt sharing, length of the transition period and its effects on the interest rates, currency and debt risk factors, public budget and fiscal consolidation, investment in infrastructure. The main results are then described analyzing the macroeconomic implications in terms of GDP growth, consumption, investment and trade; labor market and sectorial productions; alternative use of public funds (all variables are presented in terms of change from the reference scenario).

The reader should consult Part I of the study for the detailed analyses about the impacts of the alternative scenarios of secession. However, we can anticipate that the conclusions are clearly coherent with the assumptions made for the macroeconomic analysis, but, although both scenarios (and especially S01 secession under mutual agreement) are eventually beneficial for Catalonia – reflecting to a large extent the positive impact from terminating Catalonia's net fiscal transfer to the rest of Spain – they suggest prudence in interpretation. Gains are indeed evident in the long term, but they are also partially offset by problems in the short term that cannot be overlooked.

In addition, in both scenarios the Catalan economy growth is driven mostly by public consumption and investment, and the development of non-tradable services, while trade and industrial competitiveness is drastically reduced. If this would be the case the Catalan economy might become more, not less vulnerable. Moreover, both alternative scenarios are optimistic on trade because they do not include any possible boycott from Spain among the assumptions. All in all, what emerges is the inherent fragility of a secession strategy, especially if – due to a continuing Spain government rigidity – this will be forcefully unilateral with uncertain impacts that are difficult to assess. However, this fragility is not beneficial to either party and could become a driver for negotiation and hence moving towards a mutual agreement solution.

At this point, it is worth noting that both macroeconomic scenarios were necessarily limited to consider how the Catalan economy would develop

in the future - after secession from Spain – while maintaining the status of the European Union institutions unchanged. Indeed, the scenarios analyzed in Part I assume both that the current European Union statu-quo will continue until 2030, without relevant institutional changes which are still possible if the Union would be reformed, as it is nowadays claimed from many sides, in particular to respond to the crisis of the Eurozone. In other terms, scenarios S01 and S02 presented in Part I cover the first column of the table above, not the second.

The latter is covered instead in Part II of this report, where we present:

- The scenarios for cooperation of the new Catalan state with the European Union in its present institutional setting (status-quo), including forms of permanence or re-accession to the EU as well as possibilities for opting out and establishing new agreements with the EU from outside. Here we describe in more detail the options and possible legal procedures underpinning the two different S01 and S02 scenarios and the assumptions of smooth (S01) and challenging (S02) transition to a new equilibrium.
- A qualitative prospective scenario of European Union reform that would change the game for both Spain and Catalonia. The scenario is normative, in the sense that it delineates schematically the evolution towards a desirable future, with the transformation of the Eurozone into a truly political and fiscal union, the "European Political Union (EPU)". This is assumed to unfold under the pressure of disruptive economic and geopolitical dynamics, of which we see already today several signals. In such new context, Catalonia could more easily achieve the status of an independent Member State of the EPU.

After having analyzed in Part II how a European Union reform could contribute to change the game for Catalonia's independence, Part III concludes with a summary of policy implications and recommendations.

3. PART 1: THE IMPACTS OF THE ALTERNATIVE SCENARIOS OF SECESSION

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Part 1 focuses on the quantification of the economic implications for Catalonia in the event of becoming an independent state. This is a challenging task since such a decision would trigger a long chain of events, marked by a transition period and hence high uncertainty. Therefore, caution has been taken in formulating certain plausible scenarios that allow the capturing of some of the most important mechanisms in the adjustment process of Catalonia towards an independent state. Towards this end three scenarios have been quantified: a) a business as usual reference scenario in which Catalonia remains an integrated autonomous community of Spain and the fiscal imbalances with the Spanish Administration remain as they are, b) a mutual agreement scenario, in which negotiations are successful and Catalonia secedes from Spain, while agreeing to undertake 20% of Spanish debt and c) a unilateral secession scenario in which negotiations fail and Catalonia secedes from Spain, undertaking to service **12% of Spanish debt**. Different interest rates and transition periods are assumed to prevail in each secession scenario, reflecting the different degree of underlying uncertainty. The case where negotiations would lead to extra fiscal autonomy within Spain has not been examined.

The scenarios have been quantified with the use of an applied Computable General Equilibrium model, further developed and calibrated so as to include Catalonia as a separate region. The model is recursive dynamic with projections up to 2030. Modeling work in the context of this study has focused on the reproduction of key elements of macroeconomic interdependence between Catalonia and the rest of Spain. The model computes endogenously the transactions of Catalonia with its trading partners.

The results indicate that the Catalan economy benefits from secession, in both scenarios examined. The improvement can be mainly attributed to two factors: first to the correction of fiscal imbalances with the Spanish administration and second due to the productivity effects induced from investment in infrastructure. The benefit is stronger if secession is the product of mutual agreement with Spain. In this scenario, the lower uncertainty associated with Catalonia's future economic prospects boosts economic

growth, despite the higher debt burden that Catalonia is committed to service. In the secession scenario under unilateral action, Catalonia grows at a pace which is slower than the mutual agreement scenario, but still above the reference scenario. Higher uncertainty surrounding the macroeconomic environment, and currency arrangements, weak market confidence and by implication the longer transition period that characterizes the unilateral scenario slow down activity particularly in the short term. In the long term uncertainty lowers and developments in Catalonia resemble those recorded in the mutual agreement secession scenario. Relative to the reference, in the mutual agreement scenario, Catalonia sees its GDP increase by €110 billion over the 2015-2030 period, whereas in the unilateral secession scenario its economy adds €67 billion over the same period. In 2030, unemployment is lower than reference by 3.1 percentage points in the mutual agreement scenario, and by 3.2 per cent in the unilateral action scenario.

Finally, part 1 provides useful insights on the optimal use of the additional revenue that remains with the Catalan government, once secession takes place and its fiscal deficit vis-a-vis the Spanish administration is corrected. The three scenarios are premised upon the assumption that the Catalan government would have a balanced budget and would use the additional funds so as to increase public consumption and to reduce labour costs (the split of the budget between the two options has been assumed to be equal). Three alternative uses of such funds have been examined with the aim to identify the allocation that would be more efficient in stimulating economic activity: i) reduction of indirect taxes ii) reduction of employer's social security contributions and iii) increase in public expenditure. Among the three options considered, the reduction of indirect taxes is found to be most beneficial in terms of GDP, employment and competitiveness.

3.1. Introduction

Catalonia is a well-defined territory within Spain, with distinctive language, cultural, economic, legal and political identity. These characteristics, together with the historical existence of a Catalan sovereign state since the middle ages to early modern times, have long triggered calls for self-determination in Catalonia. These calls have gained strength progressively over time and complemented by a fundamental discontent for the chronic fiscal imbalances with the Administration of Spain. According to the Generalitat of Catalonia (2013), Catalonia contributes more than 19% to total revenues collected by the State's Administration but receives only about 14% of total expenditures undertaken by the latter. The economic implications of the possible secession of Catalonia from Spain are not straightforward and the lack of prior experience or similar cases in the context of the European Union, renders the *a priori* discussion of the impacts difficult. This study aims to assess the economic implications of a hypothetical secession of Catalonia from Spain. For this purpose alternative hypothetical secession scenarios have been developed and quantified with the use of a new dedicated version of the GEM-E3 computable general equilibrium model (the GEM-E3-CAT) that allows the detailed examination of the Catalan economy, and its interconnections with the rest of Spain and the rest of the world. The alternative scenarios have been designed taking into consideration the associated uncertainty and possible modeling limitations of secession, as well as the need to have

sufficiently contrasted scenarios and to include the appropriate theoretical considerations.

Extensive model development has been undertaken to include Catalonia as an individual region in the GEM-E3 model (the regional and sectoral disaggregation of GEM-E3-CAT and a brief description of the model are provided in Appendix A).

As a first step, an effort to split data on Catalonia from those available for Spain has been made. For the individual inclusion of Catalonia in the model appropriate assumptions have been employed with regards to the exogenous parameters of the model so as to reflect the alternative scenarios' assumptions. These include: fiscal parameters, such as public budget, government expenditure, debt, interest rates, infrastructure development and sectoral productivity.

The GEM-E3-CAT model projects macroeconomic and sectoral developments up to 2030, delivering trajectories for a broad range of variables including GDP, investment, employment, activity by sector, trade, public budget and current account balance. Catalonia is identified in the results as a separate region, but the model delivers results also for the rest of Spain, the rest of the EU, the rest of the world and for the world as a whole. The model builds on a reference scenario that projects developments in a "business as usual" approach, where policies and trends observed in the recent past are assumed to continue to prevail up to 2030. In the reference scenario Catalonia continues to be an integrated autonomous region of Spain and it continues to bear the consequences of the fiscal imbalances with the Administration. Subsequently, alternative scenarios are developed the results of which are juxtaposed to those of the reference scenario, enabling to evaluate their relative performance.

The secession scenarios are formulated on the basis of different conditions that would underline the negotiated separation process. These are associated with the degree of agreement or consent of Spain and of the rest of the EU to the independence of Catalonia. This will essentially determine the share of the Spanish debt that Catalonia will undertake under independence, the fiscal policy that independent Catalonia will implement, market perceptions on the long term economic viability of Catalonia's independence, etc. Central to the secession scenarios is the termination of the current fiscal deficit of Catalonia with the Spanish Administration: revenues collected in Catalonia and transferred to the State's Administration in the reference scenario ceases to be transferred in the secession scenarios. These funds thus remain with Catalonia and are directed to the financing of government spending, infrastructure investment, interest payments, bond redemptions etc.

The alternative secession scenarios simulated with the GEM-E3-CAT model are as follows:

I. **Catalonia's secession following mutual agreement with Spain**: In this secession scenario Catalonia secedes from Spain following bilateral agreement with the latter and the EU. Constructive negotiations and final consent from Spain on secession determine the share of Spanish debt that independent Catalonia agrees to undertake. Catalonia is assumed here to undertake a share of Spanish debt that is proportional

to its contribution to the Spanish GDP, accounting roughly for 20% of the Spanish debt. The transition period to an independent Catalan state which enjoys adequate market confidence is assumed to be rather short-lived in this scenario. Due to the mutual agreement on secession the uncertainties regarding future developments associated among others to currency arrangements, European Union membership, its debt profile, fiscal sustainability, the credibility of policy announcements, etc. are perceived to be lower and the risk and thus the interest rates that Catalonia will be faced with are not expected to be too elevated or highly volatile.

II. **Secession following unilateral decisions of Catalonia**: In this scenario Catalonia secedes from Spain without the consent of the latter, or of the EU. There is no agreement on the amount of debt that Catalonia will undertake. Catalonia undertakes the repayment of the part of Spanish debt which is held by Catalan economic agents (households, firms etc.). This is estimated to account for approximately 12% of the Spanish debt. However, the failure of the negotiating process would give rise to stronger confidence disruptions. Accordingly, the transition period is assumed to be longer and subject to higher volatility. Perceived risk increases. A larger degree of uncertainty prevails until a number of issues are settled: currency issues, deficit and debt policy, creditworthiness of the new sovereign state, financial market response, the state of affairs between Catalonia, Spain and the EU. The risk and thus interest rate Catalonia faces in this scenario is higher compared to the scenario of Catalonia's secession following mutual agreement.

The results indicate that sovereignty, in either case, allows the Catalan economy to reap the benefits of higher public spending and investment in infrastructure as the fiscal deficit with Spain ceases to exist and the additional funds are directed towards the financing of its own needs. Investment in infrastructure particularly improves the long-term productivity of Catalonia adding further to the positive effects of secession. The economic effects of secession are stronger for Catalonia in the case where independence follows mutual agreement with Spain. On the other hand, independence bears some significant negative repercussions. First, given that Spain is by far the largest trading partner of Catalonia, secession is shown to have an adverse impact on export activity of Catalonia towards Spain, largely attributed to lower import demand from the latter. Catalonia would also suffer from a loss of competitiveness triggered by higher labor costs under independence. With regards to risk and investment, Catalonia would find itself in a better position under secession following mutual agreement as the impact on interest rates, investment and savings is lower and rather short-lived in this case.

The remainder of the study develops as follows: Section 3 reviews the economic literature on secession and its implications for the seceding state, before it turns to an overview of the literature specific to the case of Catalonia. Section 4 reviews recent economic developments in Catalonia and historic trends of the deficit of Catalonia with the State's Administration which is the main economic reasoning underlying Catalonia's calls for secession. Section 5 presents the methodological approaches to modeling the hypothetical secession of Catalonia from Spain. Section 6 summarizes the simulation results on the alternative secession scenarios. Last section concludes.

3.2. Theoretical approaches to secession

3.2.1. Review of the literature

Several studies to date have looked at the factors triggering secession and its economic ramifications. The economic literature identifies several motivating factors which among others include:

i) Differences in policy preferences (Yarborough and Yarborough, 1998) and, more generally, heterogeneity
ii) Variation in the efficiency of redistribution and mutual insurance, and prospects for economies of scale in public-goods provision (Buchanan and Faith, 1987; Casella and Feinstein, 1992)
iii) Inter-regional differences in taxation effort (Brosio et al, 2002)
iv) Public-finance benefits of large jurisdictions versus the costs of political heterogeneity (Bolton et al, 1996; Bolton and Roland, 1997; Alesina and Spolaore, 1997)

In modeling secession more common are the assumptions about the international economy and trade. In the globalizing economy the importance of intra-country (or inter-regional) trade is generally declining relative to international trade, so the home market can be portrayed as less essential than it was (Young, 2004). The argument becomes more relevant since the access to foreign markets is secured by international trade regimes (i.e. as in the EU, the WTO, NAFTA, etc.) thus small seceding states are less vulnerable than in the past because larger economies cannot close off market access to them. Alesina et al (2000) show that under free trade and global markets even relatively small cultural, linguistic or ethnic groups can benefit from forming small, homogeneous political jurisdictions. Becker, (2009) concludes that due to the growth of the global economy and globalized trading, small nations can benefit economically more than larger ones.

To date economic theory offers no conclusive results on the impact of secession and the long-term economic viability of the emerging states (see Table 1 for a summary of the indicative literature). No clear evidence can be drawn on whether smaller states do worse and grow more slowly than the bigger ones. The literature offers some discussion on both the *pros* and the *cons* of secession and how it can affect the resulting states. However the empirical validation of the secession effects remains rather limited given the relatively few case studies that can be examined. Indicative examples of secession in modern times include the breakup of the Soviet Union, the Yugoslav Republic and Czechoslovakia. However little inference and analogies can be derived from the study of these cases given the particularities and the underlying political and economic conditions in each case.

In 1991 the Soviet Union disintegrated into fifteen separate countries. This was the joint result of failure to create a unified, centralized socialist state which underestimated the degree to which the non-Russian ethnic groups resisted assimilation into a Russianized State and of the failed economic planning to meet the needs of the State, leading thus to economic decline and disintegration. The emerging states declared independence in a peaceful manner and most of them had to undergo a lengthy transition period

with significant impacts on their economies and governance structures. In all the newly independent states the transition regarded their transformation from centrally planned economies to free market economies but also the establishment and the modernization of the existing institutions so as to support a market economy and democratic governance.

Czechoslovakia experienced a two-fold break-up in 1993. The country first disintegrated as a political union, while preserving an economic and monetary union. The Czech-Slovak monetary union collapsed shortly after. This was the result of a failure of the regions to integrate, along with low labor mobility and higher concentration of heavy and military industries in Slovakia, which made the Czechoslovak economy vulnerable to asymmetric economic shocks such as those induced by the economic transition (Fidrmuk and Horvath, 1999). In the longer run, appropriate policy, structural and market reforms can lead to improved outcomes.

The break-up of the Yugoslav Republic which led to the independent states of Slovenia, Croatia, Bosnia and Herzegovina, Serbia, Montenegro, Kosovo and the Former Yugoslav Republic of Macedonia was the result of the cultural and religious divisions between the ethnic groups making up the nation and of the centrifugal nationalist forces. The break-up also gained inertia from a series of political events which exacerbated the inherent tensions in the Yugoslav Republic. Following the death of Tito in 1980, the 1974 constitution provided for the effective devolution of all real power away from the federal government to the republics and autonomous provinces in Serbia by establishing a collective presidency of the provincial representatives and a federal government with little control over economic, cultural, and political policy[4]. The split was also affected from external factors. The collapse of the Soviet Union and communism in Eastern Europe, the reunification of Germany and especially the reemergence of a sectarian state-led nationalism in Serbia served to erode Yugoslavia's political stability. As Eastern European states moved toward free elections and market economies, the West's attention focused away from Yugoslavia. This undermined the extensive economic and financial support necessary to preserve a Yugoslav economy already close to collapse, which in the absence of a Soviet threat to the integrity and unity of Yugoslavia and its constituent parts meant that a powerful incentive for unity and cooperation was removed.

Several of the resulting independent states became members of the EU after undergoing a prolonged negotiation period and candidate country status. For instance for the Central and Eastern European Countries, accession negotiations started in 1998 and for most countries negotiations were completed in 2003. These countries had developed already from 1991 onwards institutionalized ties to the EU in the form of the "Europe agreements", which considered cooperation in political, economic, cultural and other areas, a large degree of trade liberalization and the adoption of important parts of EU rules and policies (Goetz, 2004). The stance of the EU towards the new member states included an extended period of gradual approximation and adaptation, great emphasis on the adoption and full implementation of the *acquis* prior to accession and the detailed attention paid to domestic institutional capacity to implement it, the existence of a functioning market economy, as well as the capacity to cope with competitive pressure and market forces within the Union, among other considerations.

4. See: https://history.state.gov/milestones/1989-1992/breakup-yugoslavia

Accession to the EU exerted "adaptive pressures" to the candidate countries with EU's influence being both direct and indirect (see Guillen and Pallier, 2004). Direct effects have been associated with legislation effects such as of the *Directives* and the *acquis*, the construction of the single market and the EMU. Indirect effects include soft legislation (like recommendations, National Action Plans and cohesion funds among other). Among the most important effects regarded the access of the new member countries to the single EU market and elimination of trade barriers.

Trade and single market effects have been associated with the benefits of access to a larger market and cost reductions (see Hoffmann, 2000 and Breuss, 2001 among others). Access to a single market resulted in an increasing competitive pressure for the accession countries, an increase of productivity (exploiting economies of scale) and also in a decrease of the price levels (via decrease in mark-ups). The Commission's review (see European Commission, 1996) showed that the single market has fostered the competitiveness and employment effects in the EU. General equilibrium modelling results based on the GEM-E3 model used in this review showed that EU GDP was higher by 1.1% under the single market compared to the GDP that EU would record in the absence of the single market. The results on the competitiveness effects of the single market are also confirmed in Allen et al (1998). In a more recent study Badinger (2007) finds reductions in price mark-ups after the single market came into force. However the author finds that regarding services, results are less encouraging. Mark-ups have been found to increase in the service sectors since the early 1990s, reflecting the weak state of implementation of the single market for services.

Theoretical discussions on possible secessions in EU have evolved around regions where such an option could be the case like Scotland, Flanders or Catalonia and others. Despite the rapid economic integration that has been taking place in Europe over the last decades, secession movements seem to gain speed in these regions over the last years. The secession calls have been associated with some similar features found in all three cases mentioned above (see Connolly, 2012). These regard:

i) A sense of cultural uniqueness. Catalonia, Scotland, and Flanders are well-defined territories with unique historical, cultural, economic and political identities, and they have maintained their unique identities despite being incorporated for long periods of time within larger states.
ii) High level of economic specialization and economic disputes. These regions are relatively richer compared to other regions in the respective countries. Regions have also recorded economic disputes with the respective parent states which have been exacerbated by the Eurozone crises.
iii) Considerable autonomy to administer own regional affairs making it thus easier to imagine a transition to total independence[5]. All three regions have obtained autonomous political institutions, which have tended to reinforce their separate identities and prompt demands for even greater self-rule.

In the latest financial crisis these regions were reluctant to bear the economic costs of recovery of the rest of the poorer regions in their parent countries (see Frayer, 2012; Ortiz, 2012 and Connolly, 2012 among others). On the opposite end national governments have made no efforts to

5. See: https://knowledge.wharton.upenn.edu/article/secession-answer-case-catalonia-flanders-scotland/

provide for a more fair allocation of costs and transfers to the regions claiming independence compared to other regions in their territory. It appears that this asymmetry has further intensified the calls for secession.

The EU legislation and treaties do not provide neither a legal basis for 'automatic' exclusion nor an 'automatic' or 'guaranteed' EU membership to a region going independent from a country that is already an EU member state. However when independence is imminent or has become an established fact, the reaction of the EU and its member states has traditionally been to come to terms with it, and to try to find a constructive solution for problems that may arise. According to official European documentation (see the 3.4.2003 Official Journal of the European Union[6]) and to statements by senior European officials (see among others remarks made in Madrid of the former President of the European Council, Herman Van Rompuy on Catalonia[7] and comments by European Commission Vice-President Joaquin Almunia) "*if a part of the territory of a Member State ceases to be a part of that state, e.g. because that territory becomes an independent state, the treaties will no longer apply to that territory. In other words, a newly independent region would, by the fact of its independence, become a third country with respect to the Union and the treaties would, from the day of its independence, not apply anymore on its territory*". Accordingly, subnational entities declaring independence would most likely be required to re-apply for EU membership. A prospect that may delay or – in the extreme event – hinder the membership process is the following: the constitutional arrangements standing in the EU stipulate that any countries claiming independence have to be recognized from all EU member states prior to being accepted as independent member states. Such recognition may run against the interests not only of the 'parent' Member State, but also of other Members States which have interest in preventing the creation of a precedent, to secure the integrity of their own territory. As argued by Athanassiou (2009:8) in a European Central Bank Legal Working Paper, "*in all likelihood, the assumption that the EU would treat both the rump Member State and the seceding entity as Member States would not hold true, as the rump Member State could veto the accession of the seceding entity under Article 49 TEU (see Happold, pp. 33-34). Moreover, it cannot be in the EU's interest to have an ever increasing number of veto-wielding members, as this would make its business more difficult to manage*".

Although the prevailing view in the literature is that seceding states will have to reapply for union membership, it is also acknowledged that the whole set of lengthy procedures provided in the EU treaties granting membership would not need be strictly adhered to; a swift process to grant EU membership based on negotiation and agreement would rather be followed given that they already meet requirements and criteria to be in the EU and have long applied EU legislation (see among others Ferrando, 2013). Other authors (such as Avery[8], (2014) have argued that the implicit policy of the EU in relation to independentism in Europe consists of initial reluctance followed by pragmatic acceptance, provided that the process can be considered as constitutional and truly democratic.

Schafer (2003) argues that within the EU, given the increasing heterogeneity due to its enlargement and the trend towards centralization and redistribution, secession and opting out may emerge as important consti-

6. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2004:084E:0421:0422:EN:PDF
7. http://www.consilium.europa.eu/uedocs/cms_Data/docs/pressdata/en/ec/140072.pdf
8. http://www.epc.eu/documents/uploads/pub_4393_independentism_and_the_eu.pdf

tutional arrangements for the EU as they can serve as instruments against stronger centralization and redistribution mechanisms. Secession may facilitate the mechanisms for the endogenous determination of the optimal size of the EU and for the increasing of the efficiency of the EU institutions in the sense of federalism theory.

With regards to secession calls in Belgium, the Flemish separatists have a long history. Several constitutional reforms have taken place since the sixties in order to accommodate secession calls resulting in a complex institutional structure for the country composed of three regions with wide legislative competencies, and three linguistic communities (German, French and Dutch) representing the three linguistic areas of the country (see Gullo, 2012). Regions and linguistic communities share power with the federal government, which holds very few powers apart from foreign and defence policy, social security, taxation and economic policy. This institutional architecture has been called "centrifugal federalism" (see Swenden et al., 2006) because instead of decreasing the demands of the linguistic communities/regions, they have actually encouraged demands for further decentralization.

Flanders' prosperity and calls for independence have much to do with its transformation into a knowledge-based economy with strong high-tech and services sectors, which is well-positioned between the neighboring markets of France, the Netherlands and Germany. The port of Antwerp (which is Europe's second-largest) lies only a few miles south of the border with the Netherlands, much closer to the Dutch sphere of cultural influence than to the French-speaking provinces of Belgium. The region overall is very well integrated with the European economy. As Hunin (2011) suggested Belgium might be headed towards its own "velvet divorce" similar to the case of Czechoslovakia. However in this case, the particularities regarding Brussels, the administrative capital of Europe, would be detrimental to developments. Central question here is whether Brussels will belong to either region or whether it could go as an independent capital state (see for instance Washington, D.C. in the USA) and also if Wallonia will remain independent or will adhere to France or look for other possible options (Germany, Luxembourg etc). So far the population of Flanders, in the event of independence, has not shown interest in joining the Dutch speaking country of The Netherlands.

Shieren (2000) discusses Scotland's independence from a political point of view. The author argues that the results and prospects of such independence will depend much on the EU's reaction to the latter. The question is whether the EU system can have any impact on the Scottish position and it seems that indeed it can have a great deal of impact. The status within the Community of an independent Scotland or of any successor state, even in the case of bilateral agreement between England and Scotland, is likely to be determined by the rules of Community law as interpreted and applied by the Court of Justice. The author concludes that according to European and international law Scotland cannot legally withdraw from the Community unilaterally. According to European and international law Scotland is not entitled to accede to the European Community Treaty as the result of an obtained right. For this it would need the tacit or formal consent of all member states. However there is good reason to doubt that the European member states would be prepared for a tacit or formal consent to Scottish separation[9].

9. Other member countries faced with separatist movements like Spain or Belgium may veto Scottish separation. This can be a case for Catalonia secession as well (see discussion in the following section). In any case it appears very important in determining developments the reaction of the rest of the EU member states.

Murkens (2001) argues that if Scotland went independent and was to apply to become an EU member state the possibility of transition periods should be noted. The process of negotiation of accession into the EU is perceived as unlikely to be easy even for Scotland. Evidence from other candidate countries suggests that the EU uses its pre-accession bargaining strength to extract the maximum concessions from acceding parties. Moreover, any accession treaties have to be ratified by all national parliaments, a lengthy process which can take much longer if major issues are at stake, or the treaty is rejected by a national parliament or in a referendum. In economic terms Holitscher ads Suter (1999) argue that although for Scotland, the EU is regarded as a means to gain more political influence on domestic affairs and local control of economic resources, its importance in economic terms cannot be disregarded. The authors conclude that in the absence of the European single market Scottish independence would be elusive.

In the literature secession effects have been discussed on the grounds of the ethnic homogeneity of the resulting states. Vaubel (2013) argues that if secession is motivated by ethnic differences, which does not apply to the Catalan case, the resulting states will be more homogenous, thus having stronger bonds of solidarity. Empirically, social expenditure as percentage of GDP is found to be higher in more homogenous countries. Thus secession may permit more redistribution. In addition secession strengthens competition among governments, thus by putting politicians under pressure secession may improve their performance. Competition among democratic governments limits the tax and regulation burden as people have more alternatives ("exit" or "yardstick competition"). Weingast (2013) argues that decentralizing authority to regions with more homogeneous populations allows these groups to live in harmony within a larger state (which seems to play a role in "holding together" countries like Belgium, India, Spain, and the Netherlands; see Lijphart (1975) and Stepan (2004)).

A further argument in support of secession and the smaller resulting states is associated with the diseconomies of nation scale that may arise in large and heterogeneous states. Traditionally larger size countries have been associated with larger administrative costs. In large countries, administrative and congestion costs may overcome the scale benefits of size. As countries become larger, diversity of preferences, culture, language and "identity" of their population increases (Alesina, 2003). However it has to be noted here that this stance has been challenged in other studies which argue that the costs of administration and policy coordination are correlated with the different political systems and administrative technology rather than the size of the state (Wittman, 2000).

Bednar (2007) argues that secession and exit alternatives substitute for voice by being an option to use instead of within-system protest; without contradiction, they also increase (complement) voice (Hirschman 1993, Gelbach 2005, Clark et al, 2006) by improving the threat point or bargaining position. In analyses of decentralized systems, exit options lead to subnational gains because the subnational government is able to extract a greater distributional allocation from the State (Treisman 1999; de Figueiredo and Weingast 2005). In general exit options are found to improve utility.

Concerns on the secession effects have focused on the growth prospects of smaller states. However in their study of small states, Easterly and Kraay (2000) find that small states have on average higher GDP per capita and productivity levels compared to large states and grow no more slowly than the latter. The productivity advantage of small states is associated with their human capital differences from the rest of the world. Small states need to rely on imported technology and high quality human capital to compensate for their lack of natural resources.

On the negative effects of secession and exit options authors point to the "home bias" puzzle or border effect (see McCallum, 1995) according to which a simple administrative border imposes a disproportionately large barrier to trade between two countries that are very similar. The administrative border is found to have an even larger effect on trade on countries that are much less alike (Anderson and van Wincoop, 2003). In contrast the merger of states reduces inter-state transaction costs (however it increases intra-state transaction costs, therefore small states can be economically viable, especially if they have access to major trading routes). In fact amongst the 10 richest countries of the world, in terms of GDP per capita, a majority of them can be regarded as small nations.

Alesina et al (2005) show that heterogeneity in large countries may be associated with some benefits. The benefits are associated with trade and stem from a kind of heterogeneity – the production of different intermediate goods by different regions –and this is why a larger country, for given barriers to trade, brings net economic gains through the trade channel.

Table 1. Indicative findings and literature on secession

Positive effects of secession	Indicative literature
-Small countries can be less vulnerable if access to markets and free trade agreements are in place	Young (2004)
-Seceding states are more homogenous, and social expenditure as percent of GDP is higher -Increased competition among national and seceding governments improves performance	Vaubel (2013), Weingast (2013)
-Seceding states are not subject to diseconomies of nation scale which may be present in large and heterogeneous states	Alesina(2003)
-Seceding sub-national governments can extract greater distributional allocation from the center	Treisman (1999); de Figueiredo and Weingast (2005)
-Small states are found to have on average higher GDP per capita and productivity levels compared to large states (skills creation due to lack of natural resources)	Easterly and Kraay (2000)
Negative effects of secession	Indicative literature
-Border effect of secession: Simple administrative borders impose a disproportionately large barrier to trade between countries, even similar ones	McCallum (1995), Anderson and van Wincoop (2003)
-Heterogeneity benefits in large countries (trade, production of different intermediate goods from different regions)	Alesina et al (2005)
-Large countries may be faced with benefits of scale (market size) and can provide "insurance" to their regions. Larger countries are less subject to volatility and business cycles	Alesina (2003), Griffiths et al (2013)
-Management of interregional goods may be better in large united states	Vaubel (2013)
What may determine the impact of secession	Indicative literature
-Debt-sharing across regions and generations	Cattoir and Docquier (2010)
-Transition period, transition costs and bargaining power in secession negotiations	Murkens (2001), Schroeder (1992), Grady (1991)

Source: Authors' notes

A large literature on "endogenous growth" emphasizes the benefits of scale and the fact that large countries can provide "insurance" to their regions. Alesina (2003) points out that the size of the countries affects the size of their markets and that larger economies and larger market increase productivity as larger countries can reap the benefits of economies of scale and scope. In addition larger countries can be less subject to volatility and business cycles. In times of recession, regions which perform worse than the large country average may receive net fiscal transfers from the rest of the country. Obviously, the reverse holds as well. If the smaller regions would be independent they would have a more pronounced business cycle because they would not receive help during especially bad recessions, and would not have to provide for others in case of exceptional booms. The benefits of insurance are even more obvious in the case of natural calamities (for instance an independent region hit by a disaster would probably receive less help as an independent country than as a region of a larger country).

In terms of national security secession may hamper the defense of the resulting states (or generate excessive tax burden for it) in the resulting smaller state. Griffiths et al (2013) argue that large states are generally better at defense because they have more land and a bigger population, and they can reap the benefits of having large internal economies of scale. In contrast, the attraction of small states is that the locus of decision making can be moved closer to one's own preferences.

Vaubel (2013) argues that secession raises questions about interregional goods (i.e. water resources, pollution etc.) which are shared between regions. In a united state the management of interregional goods would be decided centrally and tax burden applied equally among regions. Secession may increase per capita tax burden and average cost in the resulting states (depending on which state gets the highest share or proportion) and particularly in the smaller newly autonomous state. This may have further negative spillovers in the bordering state(s).

Finally Cattoir and Docquier (2010) point to the importance of debt sharing under secession in determining the economic viability of the emerging states. Whether secession is a better or worse option depends on the decisions on debt-sharing across regions and generations. States claiming independence may have limited bargaining power over debt sharing and may end up with a disproportionately large debt burden which may doom their autonomy prospects.

In the long run, the success of secession is associated with whether a regional economy, organized as a sovereign state, can achieve a higher growth trajectory than that achieved as being a region within a larger state. The literature points to the fact that the outcome will depend on many factors like: how much economic integration continues between the resulting and the predecessor state, how well the newly sovereign country is accommodated within international regimes, how confident foreign investors are, and so on (see Young, 2004 for a detailed analysis).

Apart from these considerations equally important remains the question of the transition to sovereignty costs (Schroeder, 1992). Transition costs

are more proximate in time, and therefore easier to assess, though still highly contestable and may outweigh the long-term benefits of secession. The literature points to several components of transition costs like:

i) Transaction costs which include resources devoted to negotiating new constitutional arrangements and settling substantive matters like the division of the debt and assets;
ii) Trade relations;
iii) Defense arrangements;
iv) Citizenship issues;
v) Costs of transferring programs, revenue sources, and public servants and of re-organizing administrations;
vi) Very substantial but hidden costs to firms and citizens of learning about the new arrangements and accommodating their behavior to them.

Other transition costs may include fiscal costs (when a region is seceding, it may have to increase taxes to pay for public services) and uncertainty costs. Uncertainty costs are the ones that have been discussed as more substantial in transition costs (see Grady, 1991 and Young, 2004 among others). They arise because economic actors have less confidence in their expectations about future conditions. Uncertainty costs occur throughout an economy, involving individuals deciding where to live, firms making choices about investment and purchases, creditors contemplating loans, and so on. Uncertainty costs considerably increase due to (see Young, 2013):

i) Political risk, or uncertainty over the impact of political and institutional change on public policies;
ii) Default risk, because of uncertainty about the creditworthiness of the emerging states;
iii Currency risk due to uncertainty on new currency arrangements and on future exchange rates;

Elevated uncertainty during the transition period can give rise to additional costs as it may be associated with limited access to capital markets, subdued investment, relocation of industries, the potential for capital flight and emigration, trade disruptions, and subsequent negative repercussions on unemployment and government revenues. Such disruptions may cause irreversible changes which may undermine tapping on potential benefits of secession at steady state.

3.2.2. Studies on the implications of Catalonia's secession

To date a number of studies have assessed Catalonia's secession and its implications. Griffiths et al (2013) propose a game theoretical model to assess the capacity of Catalonia to become a recognized, independent country with at least a *de facto* EU membership. Their model predicts an agreement in which Spain and the EU accommodate Catalan independence in exchange for Catalonia taking a share of the Spanish debt. If Spain and the EU do not accommodate, Spain becomes insolvent, which in turn destabilizes the EU. The authors conclude that the current economic woes of Spain and the EU both contribute to the desire for Catalan independence and make it possible.

Padrol (2012) reflects on the prospects of Catalonia's managing all taxes paid in the region in case of Catalonia's secession with the purpose to study the action of the Catalan Tax Agency. To perform the analysis, the different areas where the performance of the Tax Agency is projected are taken into consideration. These areas include the struggle against tax fraud, adequate level of legal certainty taxes for citizens and businesses, and assistance of the taxpayer in the voluntary fulfillment of their tax obligations and, in general, in relation to the different steps that individuals and businesses must meet towards the tax authorities. The author concludes that the management of all taxes paid in Catalonia by the Catalan Tax Agency could improve the efficiency of the public function in any of the latter areas.

Bosch and Espasa (2012) analyze the feasibility of Catalonia as an independent state from the perspective of its public finances. The study concludes that taking the level and structure of earnings and current public spending in Spain and on the assumption that Catalonia inherited them if it became an independent state, it would experience a net gain in terms of public revenues (depending on the year of analysis). The authors find that Catalonia can be completely feasible as an independent state with regard to its treasury, since it would maintain current spending levels and tax burden. Catalonia would be a state with a volume of spending in relation to the GDP comparable to other countries in the EU15, of a 38.9% of GDP. Regarding the tax burden (taxes as % of GDP) it would be placed at the bottom of countries in the EU15, with a 31.4%. Overall the authors conclude that Catalonia could have viable public finances as an independent state and considering the current condition of the Spanish public sector, would have additional net revenues.

White and Brun-Aguerre (2012) argue that an independent Catalonia might be fiscally credible over the long term but in the short run it will have to deal with significant fiscal and political questions. Transition costs of secession are estimated to be relatively high and impact significantly the independent region but also Spain. The authors provide estimations on the costs faced by Catalonia in the case of taking over various shares of the national commitments. Estimations based on 2005 data suggested that if Catalonia would undertake 100% of the total costs of national commitments, this would account to 11.6% of Catalonia's GDP.

Cominetta (2012) is less optimistic of the outcomes of Catalonia's secession. In the case where Catalonia is fully reneging on its part of the Spanish government debt and that net fiscal transfer to Spain are as big as estimated by the Catalan government (best case scenario) it is estimated to have a 20% debt/GDP levels and a 4% fiscal surplus. Even in this case the economic prospects of the region are deemed as disastrous as in all likelihood independent Catalonia would be left outside the EU and the Eurozone (no estimations on the economic prospects in the case where Catalonia is left outside the EU and the Eurozone are provided). This would have rampant effects on the new state as Catalonia would lose access to its predominant export market and it would have to introduce a new currency, with all the attached costs and risks. In addition an independent Catalonia would have to serve a public debt fully denominated in a foreign currency, without access to bond markets and without the European Stability Mechanism (ESM) and the European Central Bank (ECB) protection. Thus a sovereign default, bank runs and a huge drop

in wealth and income are estimated to be the most likely outcomes of Catalonia's secession.

On the political appraisal of the questions associated with secession Gounin (2013) argues that according to the EU legislation any seceding country will be considered a non-member of the EU and will have to undergo the same application process for EU membership as other candidate countries. However the author challenges the practical implementation of such stance as he finds it difficult for nations like Catalonia, Scotland or Flanders (region according to their legal status) to be treated like Serbia, Turkey, Moldova or other countries wanting to join the EU. Since these countries are already regions of the EU and have made explicit their intention to be considered part of the Union, it is hard to imagine developments like the EU sending forces to guard the borders with these regions. The author notes that the decline of the EU to accept as members the seceding states would contradict the founding values of the EU as the right of the regions to self-determination will be disregarded. Gounin (2013) argues that a better and plausible alternative would be the EU to negotiate simultaneously independence and EU membership of the seceding states.

A similar view is developed in a recent report prepared by the Government of Catalonia on *"Paths for Catalonia's integration in the European Union"* (see Generalitat de Catalonia, 2014). The report discusses whether a future Catalan state would be left in or out of the EU and, if the second case would apply, what would be the alternatives to re-enter the Union. The report further develops the practical consequences of the hypothetical Catalan secession and EU-entry scenarios. From the perspective of the Government of Catalonia the following alternatives are discussed:

i) Permanence scenario where the independent Catalan state retains the uninterrupted membership to the EU
ii) *Ad hoc* membership scenario where the EU does not automatically accept Catalan permanence in the Union but, given the special circumstances in this case it decides to begin the process of membership with specific features so as to allow for rapid accession
iii) Ordinary membership scenario where the EU agrees to immediately open the procedure for ordinary membership as a third state
iv) Exclusion as a member state scenario where the EU refuses to open the formal procedure for membership and the new independent Catalan state is left out of the EU *sine die*

In analyzing the alternatives following secession and Catalan EU admission the report concludes that two important factors have to be kept in mind when discussing the future developments: First, neither international law nor EU law make explicit provisions for the future of seceding states. Second, experience shows that the EU has traditionally taken a rather flexible and pragmatic approach to addressing unforeseen problems particularly those associated with the procedures for ratifying the treaties. However these factors do not mean that Catalonia's accession will happen in legal vacuum. A set of legal procedures can be applied in this case, but what might be different is the room for maneuver and freedom in interpreting the law that EU will give to itself in the case of Catalonia's secession (see Generalitat de Catalonia, 2014 for a detailed discussion).

For Catalonia, given its prior EU membership, it is argued that it could easily fulfill the requirements for entering the Union. What might be additionally needed might be the creation of regulating and coordinating bodies and of new organization structures in general which will be imposed by the EU as well as the need to transpose secondary European law to the new Catalan system. Given Catalonia's prior state of relations with the EU and its net fiscal contribution to the Union in case of being accepted as an independent state, the report argues that the most plausible scenario would be that of rapid accession under a transition regime, which nevertheless would have the same practical consequences with the case where Catalonia maintains its uninterrupted membership with the EU.

Overall the literature on secession, and particularly on the possible secession of Catalonia, offers a set of discussions on the causes, the consequences, possible outcomes and the economic ramifications of independence of the seceding states. The latter have been consulted when designing and quantifying the alternative scenarios of a hypothetical secession for Catalonia.

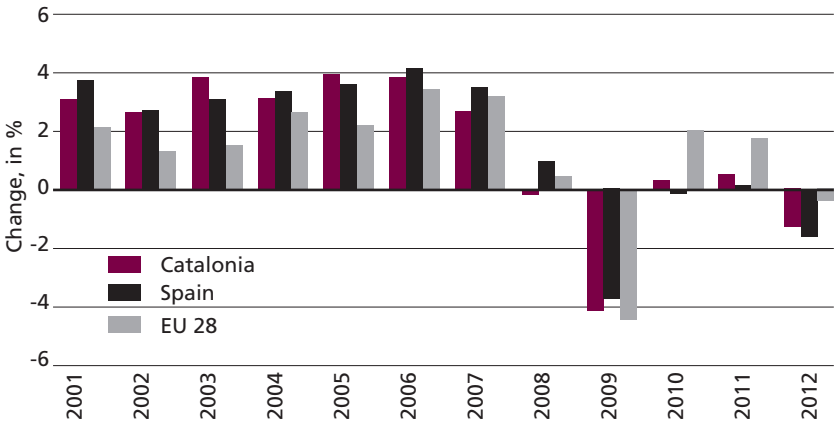
The following sections review the economic reasoning of Catalonia's calls for secession, the alternative scenarios simulated with the GEM-E3-CAT model and the methodological approaches to the latter.

3. 3. The economy of Catalonia: Recent developments and the fiscal deficit with the State's Administration

In economic terms, Catalonia is one of Spain's richest regions. It has a population of more than 7 million, GDP of around €200 bn (as of 2012) and per capita GDP of €27,500 before the crisis (in 2007). Per capita GDP exceeds the EU average: before 2008 GDP per capita in Catalonia was approximately 18% higher compared to the average EU GDP per capita, while Spain recorded GDP per capita values below the EU average by approximately 7%. Even though the financial crisis has depressed per capita wealth, Catalonia has maintained its above EU average position. Total population has been growing at 1.7% on average over the last decade slightly above the growth rate of total population of Spain (1.4%) over the same period. Population (total and active) of Catalonia has accounted for more than 16% on average of Spain's population (total and active respectively).

Catalonia's GDP has accounted for 20% of Spain's GDP on average in the last decade. Since the eruption of the economic and financial crisis, activity in the region has been adversely affected; GDP has dropped by several percentage points (Figure 1). In terms of employment, before 2008 Catalonia recorded lower unemployment rates compared to Spain (6.5% in Catalonia, 9% in Spain). However unemployment in Catalonia has risen considerably during the economic crisis: from levels below but close to 10% prior to 2008, to 16% in 2009 and to over 20% in 2012. Despite this recent increase, unemployment in Catalonia has remained below the Spanish average.

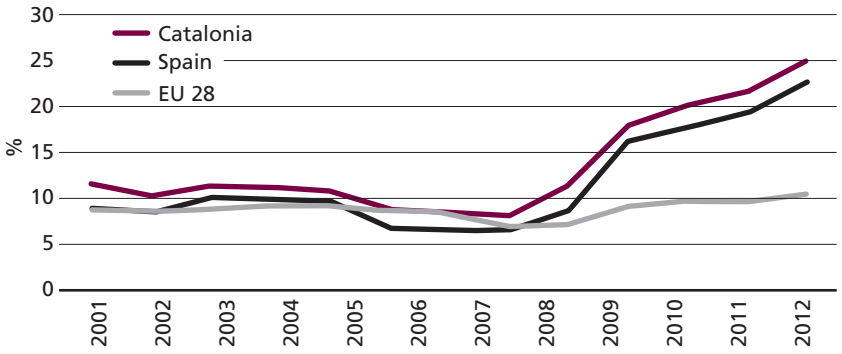
Figure 1. Real GDP growth in Catalonia, Spain and the EU28



Notes: Spain includes Catalonia
Source: IDESCAT, Statistical Institute of Catalonia

Sectoral composition of Gross Value Added in Catalonia matches that of developed economies with services recording the largest share. Industry has also accounted for a relatively large share of gross value added, higher compared to Spain but with declining shares over the last decade.

Figure 2. Unemployment rate in Catalonia, Spain and EU28, in % of total labour force



Notes: Spain includes Catalonia, EU regards EU28 excluding Croatia
Source: IDESCAT, Statistical Institute of Catalonia

One of the key economic drivers of Catalonia's calls for secession is the region's chronic budgetary deficit with the State'sAdministration and the perception that local taxpayers contribute disproportionately to Spain's national budget relative to the transfers they receive. Catalonia has been recording fiscal deficits *vis-a-vis* the State'sAdministration, which have been fairly constant over time. Catalonia's fiscal balance with the State's public sector is obtained by the difference between the expenditure which the State's public sector carries out in the territory and the volume of income deducted from it so as to finance the State's public expenditure as a whole. Fiscal balance measures the redistribution effect between territories of the State's Administration's policies (see Generalitat de Catalonia, 2013). When the income deducted from a territory exceeds the expenditure allocated to its citizens, the balance of fiscal flows with the State's

Government in the territory is negative, i.e. there is a net outflow of fiscal resources (fiscal deficit). In contrast, when the expenditure received exceeds the income contributed, there is a fiscal surplus.

The fiscal balance of Catalonia is estimated and made available by the Government of Catalonia using two standard methodologies: the monetary flow and the benefit flow. The monetary flow measures the economic impact caused by the activity of the State's Administration in a territory. The benefit flow measures the impact of an action of the State's Administration on the wellbeing of the residents in a territory. The differences between the two methodologies are minor as regards the allocation of revenues, as the agents finally bearing the tax (flow of benefit) generally reside in the territory where the tax is paid (monetary flow). The difference between the two methods is greater when allocating the expenditure: the benefit flow method takes into account - in addition to direct expenditure in the territory - the wellbeing generated for the individuals of a territory as a result of the expenditure made in another territory which also benefits them (Table 2). For example, Ministries are concentrated in a specific territory, but their activity benefits all the territories as a whole. The monetary flow method allocates all the expenditure of the Ministries where they are concentrated. The flow of benefit method allocates this expenditure among all the territories proportionally to their population. The allocation of expenditure to a territory entails, in certain cases, establishing an allocation hypothesis. For example, the payment of interest on the debt of the State is allocated proportionally to the expenditure of the State in each territory. According to the Government of Catalonia the monetary flow is best in capturing the impact of the stimulus of expenditure by the State's Administration on the recipient economies, thus it becomes the most important in times of economic crisis and high rates of unemployment (see Generalitat de Catalonia, 2013)[10].

10. This can clearly be seen in the example of spending by the ministries: if, for example, the ministries are removed from Madrid and installed in Barcelona, the fiscal deficit of Catalonia calculated using the monetary flow method is automatically reduced because the direct spending by the State's Administration in Catalonia increases. On the other hand, using the flow of benefit method, the fiscal deficit of Catalonia remains exactly the same because the spending of ministries is distributed proportionally among all the territories.

Table 2. Objectives and methodology of monetary and benefit flow measures

	Monetary flow	Benefit flow
Objective	Measurement of the economic impact of the activity of the State's Administration on a territory	Measurement of the impact of the State's Administration on the wellbeing of the residents in a territory
Allocation of revenue	In the territory where the economic capacity subject to taxation is located	In the territory where the agent bearing the tax burden resides
Allocation of expenditure	In the territory where it occurs, regardless of the geographic location of the final beneficiaries	In the territory where the beneficiary of the public spending resides, regardless of where the public service or investment is made

Source: Generalitat de Catalonia (2013)

The fiscal balance of Catalonia with the State's Administration has been stable over time (Table 3). Catalonia has contributed on average 19.5% to the revenues of the State's Administration and Catalans have received on average 14% of all the resources allocated by the State's Administration to the regions from 1986 to 2010 (Table 4). Even when estimations use the benefit flow approach the results are highly stable (figures are available for 2002 onwards). The data show that Catalonia has suffered a continuous negative shock on its economy as a result of the territorial fiscal deficit amounting on average to 8.1% of GDP in the 1986-2010 period. The stability of this result in this 25-year period is remarkable, ranging between 6.7% and 10.1% of the Catalan GDP.

Table 3. Evolution of fiscal deficit of Catalonia with Spain				
Catalonia's fiscal deficit with the State Administration				
	Monetary flow		Benefit flow	
Year	Millions of Euro	% of Catalan GDP	Millions of Euro	% of Catalan GDP
1986	-2,465	-6.8		
1987	-2,868	-7.0		
1988	-3,466	-7.5		
1989	-4,056	-7.7		
1990	-4,867	-8.3		
1991	-5,174	-8.0		
1992	-5,988	-8.6		
1993	-7,263	-10.1		
1994	-6,732	-8.8		
1995	-6,416	-7.7		
1996	-7,088	-7.9		
1997	-7,018	-7.4		
1998	-6,813	-6.8		
1999	-8,124	-7.5		
2000	-8,532	-7.2		
2001	-8,565	-6.7		
2002	-13,696	-10.1	-10,225	-7.4
2003	-13,036	-8.9	-9,586	-6.5
2004	-13,595	-8.7	-10,123	-6.4
2005	-14,186	-8.4	-10,141	-6.0
2006	-14,493	-7.9	-10,320	-5.6
2007	-15,913	-8.1	-11,136	-5.6
2008	-17,200	-8.6	-11,860	-5.9
2009	-16,409	-8.5	-11,261	-5.8
2010	-16,543	-8.5	-11,258	-5.8
Average		**-8.10**		**-6.1**
Standard deviation		**0.90**		**0.6**

Source: Generalitat de Catalonia (2013)

Table 4. Catalonia's fiscal balance with Spain				
	Monetary flow		Benefit flow	
Year	% revenue	% expenditure	% revenue	% expenditure
1986	18.9	14.2		
1987	19.0	14.2		
1988	19.0	14.0		
1989	19.1	13.9		
1990	19.2	13.8		
1991	19.3	14.0		
1992	19.4	14.1		
1993	19.3	13.7		
1994	19.3	14.0		
1995	19.8	14.8		
1996	19.9	14.7		
1997	20.0	15.0		
1998	19.6	15.0		
1999	19.7	14.3		
2000	19.7	14.4		
2001	19.7	14.6		
2002	19.8	13.0	19.5	14.4
2003	19.7	13.4	19.4	14.8
2004	19.6	13.3	19.3	14.6
2005	19.7	13.4	19.4	14.9
2006	19.6	13.7	19.3	15.1
2007	19.5	13.5	19.2	15.0
2008	19.3	13.5	19.0	15.0
2009	19.3	14.1	18.8	15.3
2010	19.4	14.2	18.9	15.4
Average	**19.5**	**14.0**	**19.2**	**14.9**
Standard deviation	**0.3**	**0.5**	**0.2**	**0.3**

Source: Generalitat de Catalonia (2013)

One of the core assumptions employed for the development of the reference scenario considers that fiscal imbalances of Catalonia with the State's Administration continue to prevail up to 2030. This assumption along with other projections adopted in the reference scenario and other methodological considerations are presented in the following section.

3.4. Modeling approach and methodological considerations

The analysis of the economic impact of the hypothetical secession of Catalonia from the rest of Spain draws on the results of the GEM-E3-CAT model. The GEM-E3-CAT model is based on the GEM-E3 model, a well-established and frequently applied in leading European research detailed recursive dynamic global CGE model[11]. Several modifications and extensions to the standard version of the model were required in order to make the model suitable for quantifying the Catalonia secession scenarios. In a first step, the regional classification of the model was further extended to include Catalonia as a separate region (a complete description is found in Appendix B). Toward this end statistics from different data sources have been collected and reconciled. The main source of data on the Catalan economy has been the Statistical Institute of Catalonia (IDESCAT). For the rest of the model regions data have been extracted from several sources including Eurostat, ILO, etc. The model is calibrated on the GTAP v.8 database. The time step of the projections of the model has also been modified so as to provide results on an annual basis up to 2020 and on a 5-year time step up to 2030. The following sections summarize the design of the reference and the alternative scenarios simulated.

3.4.1. The Catalan economy

The snapshot obtained for Catalonia shows that the Catalan economy is a service oriented one: the services sector accounts for more than 60% of the domestic production. The industrial sector has also been strong in Catalonia accounting for 32% of domestic production (Table 5).

Catalonia remains an open economy with the EU being its primary trading partner (Table 6). The rest of Spain is also an important trading partner of Catalonia with almost half of the exports and imports of Catalonia being directed to and originating from Spain in the base year. This is indicative of the strong interdependences that exist between Spain and Catalonia.

With regards to power generation in Catalonia, conventional sources account for a considerable share of electricity production, with gas accounting for 28%, indicating a dependence of Catalonia on energy imports (Table 7). Turning to security of supply and GHG emissions, Catalonia has a considerable share of nuclear power energy in electricity production in 2010 which accounts for more than 57% of electricity production.

11. The GEM-E3 model was originally developed in the '90s by a consortium involving the National Technical University of Athens, the Catholic University of Leuven (Centre for Economic Studies), the University of Mannheim and the Centre for European Economic Research (ZEW) as the core modelling team. Since the initial model version, E3MLab and other contributors have extended the model into various directions, including the development of model versions suitable for analysing growth, market reforms (e.g. EU internal market) and structural policies.
The model has been extensively used in a series of studies conducted for the European Commission and in several research projects. See: http://www.e3mlab.ntua.gr/index.php?option=com_content&view=category&id=36%3Agem-e3&Itemid=71&layout=default&lang=en, http://ipts.jrc.ec.europa.eu/activities/energy-and-transport/gem-e3/ Model versions have also been used in several scholar articles. Indicative is the work of Nemeth et al. (2011), Saveyn et al. (2011), Saveyn et al. (2012), Tsani et al. (2013) and Paroussos et al. (2014).

Table 5. Domestic production in Catalonia in the base year	
Sector	**Share in domestic production in 2004, in %**
Agriculture	1.1
Energy Sector[12]	2.4
Food products and beverages; Tobacco	5.5
Textiles	2.6
Pulp, Paper and Non metallic minerals	4.0
Basic metals	1.0
Chemicals	6.4
Fabricated metal products, except machinery and equipment	2.5
Machinery and equipment goods	3.8
Electric goods	0.6
Transport equipment goods	4.7
Other equipment goods	1.3
Construction services	10.9
Trade services	16.5
Transport services	5.5
Financial intermediation services	2.5
Other business services	14.5
Rest of market services	2.9
Recreational services	2.9
Non market services	8.3

Source: GEM-E3-CAT based on IDESCAT

Table 6. Main trading partners of Catalonia in the base year (2004)		
Partner	**Exports, in % of total Catalan Exports**	**Imports, in % of total Catalan imports**
EU28 of which	83.6	74.5
Spain	53.9	41.1
Germany	4.8	9.4
France	7.6	5.5
Italy	3.8	5.5
Portugal	3.0	1.3
Rest of EU	10.6	11.6

Source: GEM-E3-CAT based on IDESCAT

Table 7. Power generation in Catalonia in 2010	
Energy source	**Shares in electricity production, in % of total**
Gas	27.8
Nuclear	57.2
Renewable Energy Sources (RES)	15.0

Source: GEM-E3-CAT based on IDESCAT

In order to better understand the interdependencies among the different sectors of production in Catalonia and the forward and backward linkages existing in the economy, a static sensitivity analysis based on the Input-Output (IO) table available for Catalonia for 2004 has been performed so as to estimate the respective multipliers. This has been done so as to obtain a static estimation of the effects of changes in demand for one sector to the rest of the Catalan economy. Such change in demand can be associated for instance with the increase in demand for inputs

12. Energy sector in this table and in the following ones includes the GEM-E3-CAT sectors of: Coal, Crude oil, Oil, Gas, Gas extraction and Electricity supply. For the detailed sectoral aggregation of the model see Appendix A.

from the construction services sector triggered by increased investments in infrastructure that Catalonia is assumed to undertake in the alternative scenarios. In this example investments in infrastructure have three main effects in the static analysis: *i)* the direct effect which is associated with the initial requirements for the goods/services of the sectors necessary for the investment to be undertaken, *ii)* the indirect effect which is associated with the increase for intermediate demand of goods/services in the economy and *iii)* the induced effect which is associated with the increased household demand for goods/services as a result of the additional income earned (wages and salaries).

The static analysis and the identification of the IO multipliers allows for the quantification of the initial impact of a specific policy (i.e. investments in infrastructure) in the Catalan economy, that is the primary effect that changes in final demand of goods and services have on activity without considering the potential structural changes in the economy, the effects from the accumulation of capital stock and from the improvements in total factor productivity (changes and effects which are captured in a general equilibrium modeling framework). The net effect on activity is determined by the share of domestic production in total demand of each country, the Leontief coefficient, which takes into account the back and forth interconnections between sectors, as well as from the share of value to total output of each sector. Table 8 summarizes the estimated coefficients for the Catalan economy. Sectors like the construction, transport and financial intermediation services are found to record relatively larger coefficients.

Table 8. Input Output multipliers for the Catalan economy

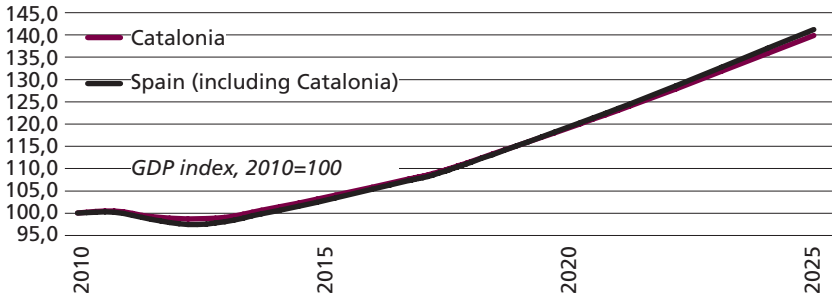
		Leontief multipliers			
		Type I (*)		Type II (**)	
No	Products	Output	Employment	Output	Employment
1	Agriculture	1.35	3.16	1.58	4.52
2	Coal	1.01	0.14	1.02	0.20
3	Crude Oil	1.01	0.17	1.02	0.24
4	Oil	1.30	0.54	1.34	0.78
5	Gas extraction	1.01	0.16	1.02	0.24
6	Gas	1.61	3.03	1.83	4.34
7	Electricity Supply	1.91	3.03	2.13	4.34
8	Food products and beverages; Tobacco	1.75	5.67	2.16	8.12
9	Textiles	1.65	6.93	2.14	9.92
10	Pulp, Paper and Non-metallic minerals	1.70	7.62	2.25	10.90
11	Basic metals	1.40	2.39	1.57	3.42
12	Chemicals	1.65	5.88	2.08	8.42
13	Fabricated metal products, except machinery and equipment	1.70	8.85	2.33	12.66
14	Machinery and equipment goods	1.51	5.82	1.93	8.33
15	Electric goods	1.31	2.32	1.48	3.32
16	Transport equipment goods	1.71	4.97	2.07	7.11
17	Other equipment goods	1.76	7.63	2.30	10.92
18	Construction services	1.97	11.89	2.82	17.02
19	Trade services	1.69	11.36	2.50	16.26
20	Transport services	1.80	8.63	2.42	12.34
21	Financial intermediation services	1.38	13.25	2.33	18.96
22	Other business services	1.48	8.84	2.12	12.64
23	Rest of Market services	1.64	8.10	2.22	11.59
24	Recreational services	1.51	12.96	2.44	18.55
25	Non market services***	1.52	20.26	2.98	28.99

* Direct and indirect effects
** Direct, indirect and induced effects
*** Non market services include public administration and defense services, education, health and social work services, sewage and refuse disposal services, sanitation and similar services, and membership organization services.
Source: Authors' estimations based on Catalan Input-Output table available for 2004

3.4.2. The reference scenario

The reference scenario develops on a path where policies and trends observed in the recent past in Catalonia, Spain and the EU continue to prevail to 2030. Catalonia remains an autonomous community within Spain. Fiscal imbalances continue to be recorded up to 2030, thus Catalonia continues to record fiscal deficits similar to those recorded over the last years (8% of GDP). Debt as a share of GDP continues the upward trend observed in the recent past while Catalonia sees little improvement in infrastructure and human capital investment. These developments hamper Catalonia's long run productivity and competitiveness. Thus Catalonia grows at rates slightly lower than those recorded for Spain (Figure 3).

Figure 3. GDP of Catalonia and Spain in the reference scenario



Source: E3-Modelling estimations

Spain (with and without the inclusion of Catalonia) grows more than Catalonia up to 2030 (Table 9). The financial and sovereign debt crisis restrains growth in Catalonia and Spain relative to the rest of the EU up to 2020; in the 2020-2030 period however growth accelerates in Spain and Catalonia and outpaces the rest of the EU.

In terms of GDP per capita Catalonia continues to register levels higher than those observed in Spain and the average for the rest of the EU (Table 10). Following an initial contraction owing to the financial crisis, per capita GDP resumes growth in the period up to 2030 in Catalonia and Spain.

13. Developments in the rest of the model regions in the reference scenario reflect the assumption that policies obsereved in the recent past prevail to 2030. Current developments such as the tensions in the EU-Russia relationships are not considered in the reference scenario projections.

Table 9. GDP in the reference scenario[13]

	GDP					
	in bn Euro, (2004)		Annual growth rate, in %			
	2010	2030	10-15	15-20	20-25	25-30
Catalonia	177	248	0.11%	1.75%	2.49%	2.43%
Spain (excluding Catalonia)	733	1037	-0.09%	1.90%	2.64%	2.58%
Spain (including Catalonia)	910	1285	-0.05%	1.87%	2.61%	2.55%
Germany	2369	2850	1.42%	0.94%	0.80%	0.56%
France	1776	2401	0.84%	1.63%	1.93%	1.68%
Italy	1384	1640	-0.64%	1.05%	1.53%	1.49%
Portugal	153	182	-1.42%	1.19%	1.78%	1.99%
Rest of EU28 countries	4678	6331	0.88%	1.83%	1.72%	1.67%
China	3120	11269	8.05%	6.78%	6.32%	5.40%
Russian Federation	600	2627	3.78%	3.37%	2.38%	2.11%
Emerging Economies	2672	5181	3.86%	3.47%	3.07%	3.07%
Rest of World	21824	39511	2.87%	3.25%	2.93%	2.99%

Source: Authors' estimations

Table 10. GDP per capita in the reference scenario						
	GDP per capita					
	in thousand Euro, (2004)		Annual growth rate, in %			
	2010	2030	10-15	15-20	20-25	25-30
Catalonia	23.8	29.8	-0.43%	1.11%	1.96%	1.92%
Spain (excluding Catalonia)	18.8	24.9	-0.20%	1.49%	2.20%	2.22%
Spain (including Catalonia)	19.6	25.7	-0.23%	1.42%	2.16%	2.17%
Germany	29.0	36.6	1.63%	1.16%	1.05%	0.87%
France	28.3	35.2	0.34%	1.19%	1.54%	1.33%
Italy	22.9	25.4	-1.11%	0.70%	1.25%	1.25%
Portugal	14.4	16.9	-1.52%	1.12%	1.72%	1.95%
Rest of EU28 countries	19.3	25.0	0.54%	1.55%	1.52%	1.55%
China	2.3	8.0	7.59%	6.50%	6.21%	5.43%
Russian Federation	4.2	7.8	3.89%	3.54%	2.67%	2.49%
Emerging Economies	3.6	6.2	3.00%	2.76%	2.51%	2.67%
Rest of World	5.3	7.3	1.33%	1.81%	1.60%	1.78%

Source: Authors' estimations

Trade patterns recorded over the last years for Catalonia continue to prevail up to 2030. Spain remains the main exporting partner of Catalonia along with the EU. The trends observed in the recent past with regards to labour market developments continue up to 2030 (the trends have been derived from IDESCAT (2013). Similar to the 2000-2010 period, Catalonia is assumed to continue to record a lower (by two percentage points) unemployment rate, relevant to Spain (Table 11). Labour force growth remains low in both Catalonia and Spain (Table 12). The labour force of Catalonia accounts for about 16% of Spain's labour force up to 2030. Sectoral production continues to grow at rates similar to those observed in the last decade (see Table 13).

Table 11. Unemployment rate in the reference scenario, in % of labour force			
	2010	2020	2030
Catalonia	17.8	17.2	7.3
Spain (excluding Catalonia)	20.5	21.2	9.9
Spain (including Catalonia)	20.1	20.6	9.5

Source: Authors' estimations

Table 12. Labour force in the reference scenario			
	2010	2020	2030
	In thousand people		
Catalonia	3,815	3,873	3,996
Spain (excluding Catalonia)	19,274	19,465	19,935
Spain (including Catalonia)	23,089	23,339	23,931
	Annual growth rate, in %		
Catalonia	1.7	0.2	0.3
Spain (excluding Catalonia)	2.4	0.1	0.2
Spain (including Catalonia)	2.3	0.1	0.3

Source: Authors' estimations

In the majority of sectors (with the exception of the energy sector), developments in Catalonia are characterized by relatively lower growth rates compared to the rest of Spain (see Table 13), but at a higher rate compared to the rest of Europe.

Table 13. Sectoral production in Catalonia in the reference scenario, annual growth rates, in %				
	2010 - 2015	2015 - 2020	2020 - 2025	2025 - 2030
	Catalonia			
Agriculture	-0.04	1.33	1.52	1.43
Energy Sector	-0.31	1.32	2.00	1.63
Food products and beverages; Tobacco	1.42	1.65	2.00	1.77
Textiles	-1.82	-1.55	-1.05	-1.10
Pulp, Paper and Non metallic minerals	-1.46	1.68	1.95	1.49
Basic metals	-0.70	0.72	0.88	0.81
Chemicals	0.74	2.06	1.73	0.93
Fabricated metal products, except machinery and equipment	0.26	2.76	3.65	2.48
Machinery and equipment goods	0.29	2.76	3.65	2.47
Electric goods	0.35	2.79	3.68	2.48
Transport equipment goods	0.33	2.77	3.66	2.48
Other equipment goods	-0.27	1.96	1.56	0.65
Construction services	-3.52	2.37	2.51	2.48
Trade services	1.05	2.13	2.38	2.37
Transport services	2.31	1.79	1.97	1.88
Financial intermediation services	0.46	1.88	2.84	3.16
Other business services	0.47	1.88	2.85	3.17
Rest of Market services	0.47	1.88	2.85	3.17
Recreational services	-0.52	1.36	2.57	2.28
Non market services	-1.08	1.41	2.34	2.25
Total	**0.07**	**1.90**	**2.45**	**2.30**

Source: Authors' estimations

On the expenditures side, Catalonia receives on average 14% of expenditures of the Spain's Administration (Table 14) while its revenues amount to 19.4% of total revenues of the Administration up to 2030 (numbers are based on the monetary flow approach).

Table 14. Catalan share to Spanish State's Government revenues and expenditures in the reference scenario		
	2015	2030
Revenue collected in Catalonia, in % of total revenues of the **State's** Administration	19.4	19.4
Expenditure allocated to Catalonia, in % of total expenditures of the State's Administration	14.0	13.7

Source: Authors' estimations based on Generalitat of Catalonia (2013)

3.4.3. Alternative scenarios on Catalonia's secession from Spain

Alternative scenarios on Catalonia's secession from Spain have been simulated with the GEM-E3-CAT model. The alternative scenarios simulated regard plausible secession alternatives which are not necessarily the most likely secession options and conditions attached to the latter. For the secession alternatives modeled appropriate assumptions on plausible developments following secession are employed (discussed below in detail). Two alternative scenarios have been developed that build upon different conditions attached to Catalonia's secession from Spain regarding the consensus of Spain and of the rest of the EU on Catalonia's independence. These regard:

- **Mutual Agreement Scenario (S01)** in which Catalonia secedes following mutual agreement with Spain and,
- **Unilateral Exit Scenario (S02)** in which Catalonia secedes from Spain without the consent of the latter (or of the EU).

The degree of consent will in turn affect other important contingencies, including the European Union membership, the share of Spanish debt that Catalonia will assume under independence, and the length and costs of the transition period.

Different options and outcomes of self-governance of the new Catalonian state have been embedded to the two scenarios. These regard:

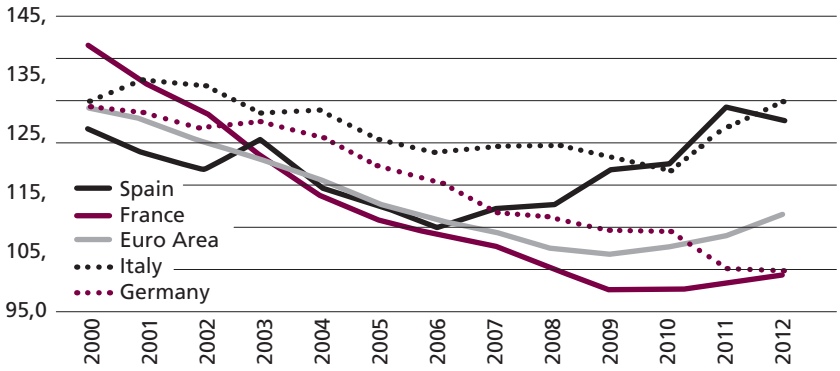
- Public budget implications and fiscal consolidation
- Infrastructure
- Uncertainty

The mechanisms through which the above are modeled are discussed below.

3.4.3.1. Debt sharing

Domestic residents in Spain have held on average 60% of Spanish gross national debt over the 2000-2012 period (Figure 4). In 2012, the share stood at 62%. Disaggregated data on the amount of Spanish debt held by Catalans is not available. In the event that Catalonia becomes an independent state it will need to undertake and service a portion of the outstanding Spanish debt. Debt sharing alternatives vary by secession scenario. In the mutual agreement scenario, the consent on the part of Spain is premised upon the willingness by Catalonia to undertake a significant share of Spain's national debt. In determining this share, the present study follows Barceló-Soler (2013): a possible and rational share of the debt burden that Catalonia might undertake under secession would be approximately 20% of Spain's national debt, proportional to the -relatively stable overtime - weight of the Catalonian economy to the Spanish GDP. This would take Catalonia's debt/GDP at somewhat above 100%.

Figure 4. Debt held by residents, in % of total (2000-2012



Source: Gordo et al (2013), Bank of Spain Economic Bulletin, July-August 201

Debt sharing under unilateral action will result in Catalonia assuming a lower share of Spanish debt that is more or less restricted to the portion held by Catalan citizens. Since no data is available on the share of Spanish debt held by Catalan agents, it is assumed here that (i) given that 60% of

Spanish debt is held by Spanish residents (according to Gordo et al (2013)) and (ii) Catalonia accounts for about 20% of Spanish GDP, Catalonia will be willing to undertake 20% of the debt held by residents in Spain, *i.e.*, 12% of total Spanish debt. This would bring the debt/GDP ratio of the new independent state to 60%.

The two alternatives with respect to debt sharing are presented below:

Table 15. Assumptions on Spanish debt sharing in the alternative scenarios

	Mutual agreement (Scenario S01)	Unilateral action (Scenario S02)
Share of Spanish debt undertaken by Catalonia	20% of total Spanish debt (proportional to Catalonia's contribution to Spanish GDP)	12% of total Spanish debt
Debt as % of Catalan GDP	100%	60%

Source: Authors' notes

Debt sharing will affect the interest rates Catalonia will be faced with and its ease of access to capital markets (discussed below).

3.4.3.2. Transition period

The length of the transition period per scenario is defined using evidence from countries defaulting on their debt and their emergence following default provided by Standard and Poor's (see Standard and Poor's, 2011). Historically, countries defaulting on their debt have been able to emerge from default and return back to their pre-default ratings in a relatively short time period varying from a few months to few years (evidence suggests that the emergence from default does not extend over many years). The present study makes use of the evidence on the time when countries return to their pre-default ratings following default so as to set the time legth of the transition period following secession. In the case of mutual agreement, the transition period is envisaged to be relatively short-lived and similar to that recorded for defaulting countries; this is set to be 3 years following secession. In contrast, in the unilateral action scenario the transition period is assumed to be double, (*i.e.*, 6 years). ***Recall that these assumptions on debt ratings are fixed in a scenario where there's no credible political agreement in relation to debt. Nevertheless, the effects of a expected balanced budget's policy or the following negotiation agreements may lower debt risk during the transition period.***

3.4.3.3. Public budget and fiscal consolidation

Catalonia receives revenue from several sources: income taxes, (VAT), the Social Security income, the income of Public companies such as State Harbors, autonomous institutions, state agencies and other public bodies (see Bosch and Espasa, 2012 and Generalitat of Catalonia, 2013). The largest part of this revenue is currently transferred to the Administration of Spain. Revenue returns to Catalonia in the form of public expenses made directly by the Spanish government or in the form of transfers of resources to the regional government (Generalitat), local governments and the private sector.

The projections on the fiscal budget employed in the reference scenario are based on the results of Catalonia's fiscal balance with the Spanish StateAdministration in 2010 published by the Generalitat of Catalonia (2013) [14]. In this study the balanced budget hypothesis is used to compute the total revenue contribution by Catalonia to the Spanish government and the expenditures which should be transferred to Catalonia by the Spanish StateAdministration.

In both secession scenarios it is considered that Catalonia will cease to transfer tax revenue to the Spanish administration from 2015 onwards; this translates to an additional revenue of 8% of GDP. Accordingly, Catalonia will be left with some fiscal space, which will allow some leeway to either increase public consumption/expenditure or to reduce taxation. In the context of the present study, the Catalan government is assumed to run balanced budgets following secession.

In an independent Catalonia the public costs and the administration costs are assumed to be higher. The new independent –small in size – Catalan state will cease to benefit from the existence of scale economies resulting from its integration with Spain. This would imply higher unit costs of public services and also higher needs of spending on services and national public goods (defense, justice, government IT systems, de-merging of databases, functions and processes, transferring of public servants and pensions systems) which today are provided centrally in Spain. White and Brun-Aguerre (2012) assess that the present difference between tax payments and public spending would be eroded under Catalan independence due to increased public costs and spending. Even in the case where Catalonia would service only half of such costs the amounts required would reach 5.8% of GDP. These estimations imply minimal benefits on fiscal balance from the independence of Catalonia. Bosch and Espasa (2012) anticipate better prospects under Catalan independence, as the new state would achieve higher effectiveness in the fiscal system, better distribution among categories of payers and more efficient spending, all of which can be drivers of growth. Their study claims that such reforms are difficult to implement under present circumstances but they would be facilitated in the context of Catalan sovereignty.

In designing the alternative scenarios explicit assumptions have been employed with regard to the fiscal stance of Catalonia in each case. For the quantification of the hypotheses the approach employed by Bosch and Espasa (2012) has been adopted making the following assumptions:

i) Catalonia under secession keeps the same tax system that is in place today;
ii) In an independent Catalonia the level of the tax burden follows its recent trend;

Regarding expenditures of the independent Catalonia it has been assumed that the Catalan government undertakes the same commitments as the Spanish StateAdministration. All commitments and decisions regarding pensions, public sector wages etc. made by the State Administration are honored by the independent Catalonia (similar assumptions are adopted by Bosch and Espasa (2012) in their analysis). Expenditure is assumed to increase in the secession scenarios due to

14. http://www20.gencat.cat/docs/economia/70_Economia_SP_Financament/documents/Financament_autonomic/balanca_fiscal_Catalunya_Administracio_Central/05%2021%20Fiscal%20Balance%20(summary)%20(2).pdf.

the additional to the reference investment in state structures (services which today are provided centrally in Spain) and in infrastructure (see below). The independent Catalan government is expected to invest (additional to reference) 3% of its GDP in state structures and 1.3% of its GDP in infrastructure.

Table 16 summarizes the assumptions employed on how the additional public revenues (8.1% of Catalan GDP) will be used by the Catalan government in the secession scenarios. These revenues are additional to the reference in the sense that they include revenues collected in Catalonia and not transferred to the Spanish Administration, which was the case in the reference scenario.

The main hypothesis is that Catalonia under secession will aim for a balanced budget. Under this condition additional government revenues will cover: (1) expenditure in state structures investment, (2) expenditure in infrastructure investment, (3) additional interest payments due to the higher debt and deficit than in the reference scenario and (4) scenario government consumption. The balanced budget implies that the debt-to-GDP ratio decreases as GDP grows over time. Given that in the period 2015-2030 a 2.2% average annual GDP growth for Catalonia is projected in the reference scenario, debt-to-GDP ratio can be reduced by more than 20 percentage points in both secession scenarios.

Table 16. Additional revenues and expenditures for Catalonia in the secession scenarios

	Mutual agreement (Scenario S01)			Unilateral action (Scenario S02)		
	2015	2020	2030	2015	2020	2030
Additional revenues						
in bn € 2010	16.6	18.1	23.1	16.6	18.1	23.1
in % of GDP	8.1	8.1	8.1	8.1	8.1	8.1
Allocation of additional revenues, in % of total						
Infrastructure	15.7	15.7	15.7	15.7	15.7	15.7
State capacity*	37.0	37.0	37.0	37.0	37.0	37.0
Government consumption	1.35	9.7	15.8	10.4	13.9	19.8
Tax Reduction	1.35	9.7	15.8	10.4	13.9	19.8
Payment to balance the public budget	9.9	0.0	0.0	9.9	0.0	0.0
Interest payments	34.7	27.9	15.7	16.6	19.5	7.7

*Spending in state structures to cover services which today are provided centrally in Spain
Source: Authors' estimations

An important element to be considered is fiscal sustainability of autonomous Catalonia. As explained above, autonomy will in itself bear a front-loaded fiscal impact, which is however expected to be financed through the elimination of the fiscal deficit *vis-à-vis* the Spanish State Administration. Debt redemptions differ in the two scenarios, being higher in the mutual agreement scenario; by analogy, independent Catalonia will need to resort to increased bond issuance in the mutual agreement scenario to meet its financing needs. By implication, the terms of its access to credit and capital markets differ across the two scenarios, being more restrictive in the unilateral action scenario; thereafter the terms are improved in both scenarios, with interest payments in the unilateral action scenario being lower than the mutual agreement scenario in the longer term due to the lower debt that needs to be serviced.

In order to quantify the effects of fiscal imbalances on the solvency of Catalonia (and Spain), the approach of Alogoskoufis (2013) in defining and estimating debt sustainability has been adopted. Following this approach, based on the comparison of real interest rate on government debt and the growth of GDP, the debt accumulation process is defined as sustainable in the case where the rate of GDP growth is higher than the real interest rate on government debt.

3.4.3.4. Infrastructure

Over the last decades Catalonia has recorded a deficit of investment and stock compared to its relative population and GDP weight to Spain. While population and GDP have accounted for approximately 16% and 20% of the respective total Spanish (including Catalonia) population and GDP, infrastructure stock in the region has on average accounted for less than 14% of the total infrastructure stock of Spain over the same period (Table 17). In the period 1991-2008 investment in infrastructure in Catalonia has accounted for 0.7% of Catalan GDP while the Spanish meant was 1.1%[15].

Table 17. Total stock of infrastructure in Catalonia, in % of total stock of infrastructure in Spain

Year	1964	1970	1980	1985	1990	1995	2001	2004
Catalan stock of infrastructure, in % of Spanish total	13.1	14.3	14.9	14.4	13.6	13.7	13.3	13.6

Source: Generalitat de Catalonia (2009)

In the reference scenario it is assumed that the trend in infrastructure investment from the State's Administration directed to Catalonia in the 1991-2008 period continues to prevail up to 2030. Thus up to 2030 investment in infrastructure in Catalonia accounts to 0.7% of Catalonia's GDP.

In case Catalonia's secession materializes, the Catalan government will increase the financing of infrastructure projects. These might include the construction of an international airport hub, direct rail connections, active political and financial support for the Mediterranean rail-way corridor, energy infrastructure, etc. These prospective infrastructure investments will bring benefits to productivity and competitiveness will improve business, industry and tourism attraction and might further attract skilled personnel.

The *National Pact for Infrastructure Investments* (see Generalitat of Catalonia, 2009) is assumed to be undertaken by the independent Catalan government. The purpose of the pact has been the agreement on the infrastructure requirements for the sustainable development of the country and the welfare and quality of life of its residents. The pact covers transport, water, waste, energy, telecommunications and land productivity related infrastructure investments. The pact's horizon extends to 2020.

According to the pact Catalonia should aim at investing 2% of its GDP in infrastructure projects. The additional from reference infrastructure investments in the secession scenarios are assumed to amount to 1.3% of the Catalan GDP over the period 2015-2030. Under this assumption the amounts invested in infrastructure in Catalonia up to 2030 are summarized in Table 18. These investments are assumed to take place under both the unilateral and bilateral secession scenarios.

15. See Generalitat de Catalonia (2009), 'Pacte Nacional per a les infraestructures'. Available at: http://www.gencat.cat/especial/pni/pdf/pni.pdf

Table 18. Investments in infrastructure in Catalonia in the reference and in the secession scenarios				
	2015	2020	2025	2030
Reference scenario				
Investments in infrastructure (in % of GDP)	0.7	0.7	0.7	0.7
Investments in infrastructure (in bn € 2010)	1.5	1.6	1.8	2.1
Secession scenarios (Mutual agreement- Scenario S01 & Unilateral action-Scenario S02)				
Investments in infrastructure (in % of GDP)	2.0	2.0	2.0	2.0
Investments in infrastructure (in bn € 2010), in addition to reference	2.6	2.8	3.2	3.6
Investments in infrastructure (in bn € 2010), total	4.1	4.5	5.1	5.7

Source: Authors' estimations

Total infrastructure investment is differentiated by type of infrastructure distinguishing among transport (rail, road, air, sea), information and communication technology-ICT (investments in ICT are mainly private), education and human capital, energy and state and governance structures. To calculate the split among the different types the following sources have been consulted:

- National pact (Generalitat of Catalonia, 2009);
- Disaggregated data on infrastructure investment in the period 1992-2011 in the EU provided in a recent study of Dobbs et al. (2013) prepared for McKinsey&Company;
- Data on infrastructure investment undertaken in various countries as extracted from the World Bank, World Development Indicators database.

Infrastructure stock depreciates over time. In this study depreciation rates from Dobbs et al. (2013) have been employed where the depreciation rate for transport and power has been set at 2.5%. It has been assumed that the depreciation rate is lower for investment in education and state capacity building, while it is higher for the ICT sector (5%) given the rapid technological innovations taking place.

Table 19. Investments in infrastructure by type and depreciation rate of infrastructure in Catalonia		
Infrastructure category	**Investment in infrastructure, in % of total**	**Depreciation rate, annual, in %**
Transport (rail, road, air, ports)	35	2.5
Information and communication technology (ICT)*	25	5.0
State capacity and governance structure	5	1.5
Education and human capital	15	1.5
Energy sector	20	2.5

Source: Authors' estimations based on Generalitat de Catalonia (2009), Dobbs et al. (2013) and World Bank, World Development Indicators

Investments in infrastructure are expected to have multiple effects on the Catalan economy. They are expected to stimulate activity in the sectors involved in the construction of infrastructure as they generate additional demand for sectors providing inputs to infrastructure investments (construction, market services, etc.). This is expected to boost demand and consumption in the domestic sectors exerting a positive effect on GDP. This effect will also be associated with multiplier effects in the economy where higher demand for sectors providing inputs to infrastructure investments will generate income and thus demand for other sectors of the economy. Demand and multiplier effects associated with investments in infrastructure take place in the short

term, last only during the construction phase and are partly offset by pressures on capital and labor markets if these markets do not display sufficient flexibility.

Investing in infrastructure will increase the total factor productivity in the Catalan economy which exerts a positive permanent effect on GDP (exports will become more competitive, etc.). Increases in total factor productivity imply lower unit costs for delivering services, such as transportation, communications and tourism. The effect on total factor productivity is a long-term permanent benefit and it depends on the type of infrastructure. In the GEM-E3-CAT model, the productivity effects caused by new infrastructure depend on the already accumulated stock of infrastructure, are differentiated by type of infrastructure and the related sectors which benefit in terms of productivity.

3.4.3.5. Risk and interest rates

An important determinant of the costs of transition to an independent Catalan state is the impact of uncertainty. Uncertainty would affect confidence in the Catalan economy and in turn its ease of access to capital markets. The following major risk factors are considered:

i *Currency risk* associated with the uncertain status of the EU membership of Catalonia under secession; the currency it will use;
ii. *Deficit and debt risk* associated with the policy that the independent Catalan government will implement regarding public deficit;
iii. *Debt risk* related to the long term debt profile/commitment to fiscal policies consistent with a sustainable debt profile.

Currency risk is largely associated with the status of EU membership of the seceding Catalan state. The prevailing consensus which the present study adopts is that the outcome on EU membership of the new Catalan state will only come with a lag. In the unilateral secession scenario the process could prove cumbersome and the lag lengthy[16]. This is premised on Article 49 of the Treaty on the European Union that provides that the accession of a new member state must be ratified by all other member states, which could potentially provide dissenting Spain with veto power. Accordingly, in the **unilateral secession scenario** upside risks prevail due to the fragile commitment to the euro, with implications on trade, Catalan banks' access to funding, deposit flows and business and investment sentiment. Accordingly, currency risk is eminent up to 2020, but eliminated afterwards as markets slowly gain confidence on the independent state. Currency risk however is mitigated in the **mutual agreement scenario**, which assumes that constructive negotiations on EU membership are swift and perceived by markets to be credible, thereby eliminating currency risk.

The **debt risk factor** corresponds to the difference between the government primary surplus or deficit and the primary surplus needed for the debt to be sustainable. For the assessment of the sustainability of Catalan debt in each time period the approach proposed by Alogoskoufis (2012) has been used in order to determine the primary surplus needed for the debt to be solvent. **Deficit risk factor** corresponds to the risk that economic agents perceive associated with the consistency of the government to pursue balanced budget policies. Catalan deficit and debt targets under independence, especially during transition affect the perceptions and anticipations on the long term sustainability

16. Such event may also force both parties to quickly negotiate and come to a lasting and successful agreement for all.

of the Catalan fiscal policy and debt targets. In the first years of secession the perceived risk of future public policies and of the ability of the economic actors to commit to fiscal policy announcements and meet their policy targets might be high; accordingly the uncertainty associated with deficit policies is expected to be higher than the reference during the transition period in both secession scenarios and the highest in the case of unilateral secession.

At this point it is useful to make a distinction regarding the assumptions on the policies implemented by the Catalan government following secession and the risk perceptions of economic agents associated with deficit. In the secession scenarios it is assumed that the Catalan government aims for and implements a balanced budget policy. Nevertheless it is assumed that it takes time for economic agents to realise the time consistency of the Catalan government with regards to the implementation of balanced budget policies. At the early years of transition following secession, economic agents perceive a deficit risk. This risk is assumed to be higher in the case secession follows unilateral action. In the latter transition years economic agents lower their defitic risk perceptions as they realize the consistency of the Catalan government in implementing balanced budget policies. Economic agents perceive no deficit risk in the long run in both secession scenarios. As a sensitivity run, a variant of the unilateral secession scenario has been simulated where the deficit risk is set equal to the scenario in which secession follows mutual agreement (see section 3.5.1).

In the alternative scenarios specific targets of debt-to-GDP ratios have been assumed to be set by the Catalan government (see Table 20). In the mutual agreement scenario (Scenario S01) the debt undertaken by the Catalan government amounts to 100.5% of its GDP (Catalonia undertakes 20% of Spanish debt, proportional to its contribution to Spanish GDP). Each year a 10% of the debt is refinanced with bonds and loans at the prevailing interest rate.

In the unilateral secession scenario Catalonia undertakes a lower share of Spanish debt: that which corresponds to the debt undertaken by Catalan entities (private sector and banks). This is taken to be 12% of Spanish national debt. Accordingly the debt undertaken by Catalonia stands at 60.3% of Catalan GDP once secession takes place. However, unilateral action fuels a sharp increase in uncertainty faced by the public and private sector in Catalonia. The lack of consent is negative for market and business sentiment, which in turn places a drag on investment, affects financial flows and the outlook for growth. The borrowing terms are negatively affected. The debt as a share of GDP follows a slightly increasing path in the first years following secession but gradually declines in the longer term. Similar to S01, a 10% of the debt is financed at the prevailing interest rate.

Table 20. Debt-to-GDP ratio of Catalan government, in %

	2014	2015	2020	2025	2030
Reference scenario	30.7	31.1	29.6	26.2	23.2
Mutual agreement - Scenario S01	100.5	99.8	87.7	77.2	68.2
Unilateral action -Scenario S02	60.3	60.9	53.8	46.2	41.0

Source: Authors' estimations

In the GEM-E3-CAT model these uncertainties are captured and quantified via the interest rates. To reflect uncertainties a higher risk premium would be requested by markets. Interest rates are adjusted accordingly with the use of risk factors which change by scenario based on the assumptions

employed in each case. In the reference scenario risk factors equal to 1 while their value is differentiated by scenario and year reflecting the different underlying assumptions.

Table 21 summarizes the values of the risk factors and the interest rates Catalonia is faced with in secession following mutual agreement. Since secession is the result of bilateral agreement between Catalonia and Spain/EU in this scenario no currency risk is applied to Catalonia; Catalonia is expected to remain within the Euro and continue using the Euro as its official currency. No Euro-exit actions are assumed to be taken by the EU. Deficit and debt risk factors are assumed to subside relatively fast and market confidence in the new independent state is soon restored.

Table 22 summarizes the values of the risk factors and the interest rates Catalonia is faced with in secession following unilateral action. Increased perceived risk in the unilateral action scenario, amid elevated currency risk, political risk and default risk, would imply that the debt of the seceding state would stand at a higher premium for a longer period of time. Accordingly, the risk factors are higher in this scenario and require a longer time to be smoothened out.

Table 21. Interest rates and risk factors for Catalonia in mutual agreement scenario (Scenario S01)

	Interest rate, in %	Currency risk factor	Deficit risk factor	Debt risk factor
2015	5.06	1.00	1.25	1.04
2016	4.35	1.00	1.15	0.97
2017	3.68	1.00	1.05	0.90
2018	3.29	1.00	1.00	0.84
2019	3.09	1.00	1.00	0.79
2020	2.92	1.00	1.00	0.75
2025	2.76	1.00	1.00	0.71
2030	2.70	1.00	1.00	0.69

Source: Authors' estimations

Table 22. Interest rates and risk factors for Catalonia in unilateral action scenario (Scenario S02)

	Interest rate, in %	Currency risk factor	Deficit risk factor	Debt risk factor
2015	7.42	1.40	1.30	1.05
2016	7.20	1.40	1.30	1.01
2017	7.02	1.40	1.30	0.99
2019	6.05	1.40	1.20	0.92
2020	4.32	1.20	1.10	0.84
2025	2.82	1.00	1.00	0.72
2030	2.78	1.00	1.00	0.71

Source: Authors' estimations

Table 23. Interest rates for Catalonia and Spain in secession scenarios

		2015	2016	2017	2018	2019	2020	2025	2030
Mutual agreement - Scenario S01	Catalonia	5.06%	4.35%	3.68%	3.29%	3.09%	2.92%	2.76%	2.70%
	Spain	5.56%	4.78%	4.05%	3.62%	3.40%	3.21%	3.03%	2.97%
Unilateral action - Scenario S02	Catalonia	7.42%	7.20%	7.02%	6.87%	6.05%	4.32%	2.82%	2.78%
	Spain	5.84%	5.02%	4.25%	3.80%	3.57%	3.37%	3.18%	3.12%

Source: Authors' estimations

Table 24. Main scenarios' assumptions on Catalonia's secession from Spain		
	Mutual agreement scenario- Scenario S01	Unilateral action scenario - Scenario S02
Secession mode	Mutual agreement between Catalonia and Spain/EU	Unilateral action of Catalonia. No agreement with Spain/EU
Transition period	Short	Long
Debt sharing	Catalonia undertakes 20% of Spanish debt (Proportional to its contribution to Spanish GDP)	Catalonia undertakes 12% of Spanish debt (Equal to Spanish debt held by Catalan agents)
Fiscal stance	Balanced budget.	Same as S01
Investment in infrastructure	2% of GDP in 2015-2030 invested in several infrastructure categories (transport, energy, state capacity, ICT, human capital, etc.) by set shares. Infrastructure stock subject to depreciation	Same as S01
Risk factors and interest rates	Catalonia faced with deficit and debt risk which are higher than reference in the transition period but smooth out relatively fast. Catalonia faced with higher than reference interest rates over a relatively short period.	Catalonia faced with currency, deficit and debt risk which are higher than reference in the transition period. Their smoothing out takes relatively longer thus Catalonia faced with higher than reference interest rates over a longer a period of time.

Source: Authors' notes

3.5. Results of the alternative secession scenarios

3.5.1. Macroeconomic implications

The simulation results show that under secession Catalonia derives a net benefit. The scenario results for GDP for Catalonia are presented in Table 25.

The effects on the macroeconomic aggregates for Catalonia are negative in the first years following secession but they bounce back gradually and return to positive later on in the period of study. This bouncing back takes a longer time to materialize under unilateral secession (scenario S02). The scenario results on the main macroeconomic aggregates for both scenarios are reported in Table 27 and Table 28.

The results indicate that Catalonia benefits in terms of GDP from secession, compared to reference. The benefit is stronger if secession is the product of mutual agreement with Spain. In this scenario, the lower uncertainty associated with Catalonia's future economic prospects and its balanced public budget boost economic growth, despite the higher debt burden that Catalonia is committed to service. **In secession under unilateral action, Catalonia grows at a pace which is slower than the mutual agreement scenario**, **but above the reference scenario**. Higher uncertainty surrounding the macroeconomic environment, currency arrangements and financial market response, and by implication the longer transition period that characterizes the unilateral scenario negatively affect activity and the short term economic prospects of Catalonia. Despite the elevated market and interest rate volatility during the transition period, the beneficial in terms of gross debt initial conditions for the new state in the unilateral secession scenario mitigate the risk of a deficit-debt spiral materializing. In the longer term, the favourable debt and investment profile, coupled with the resolution of outstanding issues, notably currency issues, restore confidence in the economy, which translates to growth outperformance relative to both the reference and the mutual agreement scenarios in the outer years of the projection horizon (2020-

2030). Overall, over the 2015-2030 period, the cumulative gain in terms of GDP in the unilateral secession scenario is 2% above reference, and -1.2% below the mutual agreement case.

Table 25. Impact on GDP in scenario S01 and S02

	Catalonia	
	NPV* of GDP, 2015-2030	Cumulative GDP, 2015-2030
Reference, in bn € 2004	2591.1	3347.4
S01, in bn € 2004	2671.6	3457.0
S01, % change from reference	3.1	3.3
S02, in bn € 2004	2634.6	3414.8
S02, % change from reference	1.7	2.0

* To calculate the Net Present Value (NPV) of the GDP a discount rate of 3% has been applied.
Source: GEM-E3-CAT

The macro-economic effects of secession are marginal for the EU while Spain experiences a negative effect in GDP in both secession alternatives with the effects being more pronounced in the case of unilateral secession of Catalonia. Simulation results for Spain and the EU are summarized in Appendix C.

Simulation results from the sensitivity run (S02_DF) where deficit risk perception in the unilateral action scenario is set equal to the scenario of secession following mutual agreement are summarized in Table 26. In this case economic agents perceive the same risk regarding the implementation of balanced budget polices irrespective of whether secession is the result of unilateral action or mutual agreement. The simulation results show that Catalonia benefits more in this scenario as compared to the standard scenario of unilateral action on secession. Nevertheless benefits remain lower than those resulting from mutual agreement on secession.

Table 26. Impact on GDP in scenario S02_DF

	Catalonia	
	NPV* of GDP, 2015-2030	Cumulative GDP, 2015-2030
Reference, in bn € 2004	2591.1	3347.4
S02_DF, in bn € 2004	2658.5	3443.2
S02_DF, % change from reference	2.6	2.9

* To calculate the Net Present Value (NPV) of the GDP a discount rate of 3% has been applied. In the S02_DF scenario deficit risk parameter is set equal to S01 scenario. For the rest of the modelling assumptions the standard specifications of the S02 scenario apply.
Source: GEM-E3-CAT

3.5.2. Impact on Consumption, Investment and Trade

In both scenarios, the retention of revenue previously channeled to the State administration implies that Catalan public consumption is significantly above reference, to the tune of 27% to 38%. The increase reflects a low base effect. Public consumption exceeds further the reference in the unilateral secession scenario, as a result of lower debt redemptions. The increase in public consumption is a driver of economic growth in Catalonia, early in the projection period (2016 onwards) for the mutual agreement scenario. However, if the decision is unilateral the growth impact of public expenditure comes with a significant delay (beyond 2020). In both scenarios examined in the short run Catalonia suffers the effects

of higher uncertainties and reduced confidence in its economic viability as an independent state. When these effects are smoothed out and market confidence on Catalonia is established, the independent country enjoys the benefit from higher government spending compared to the reference scenario. The same pattern arises for investment in Catalonia. Elevated uncertainty poses a drag on investment (relative to the reference), which in the mutual agreement case is rather short-lived (lasts during the 2015-2016 period only), but **in the case of unilateral action the drag is severe, and persistent (up to 2020), with corresponding implications on economic growth.**

Household consumption decreases from the reference case in both scenarios examined*given that the reference case is not assuming recession, Table 28 still shows a growing path on GDP terms. However, during the first five years following unilateral secession, growth would be between 2.5 and 0.15 points lower than in the reference scenario".* The decline is sharper in the unilateral action scenario, in line with the longer period of uncertainty and higher interest rates prevailing. The mutual agreement case sees a short lived reduction in household consumption that only lasts during the 2015-2016 period. In 2017 onwards and up to the end of the projection horizon private consumption returns to levels above reference.

Table 27. Macroeconomic effects of scenario S01: Results for Catalonia

Change from reference		2015	2016	2017	2018	2019	2020	2025	2030	Cumulative 2015-2030
in %	Gross Domestic Product	-0.85	0.45	1.91	2.51	2.98	3.46	4.03	4.32	3.27
	Investment	-3.90	-1.51	0.91	1.46	1.83	2.17	2.46	2.10	1.61
	Public Consumption	27.30	28.22	29.36	30.60	31.88	32.48	34.77	36.39	33.22
	Private Consumption	-3.24	-0.43	2.04	2.56	2.98	3.39	4.40	5.50	3.49
	Exports	-6.65	-6.30	-5.96	-5.77	-5.63	-5.26	-5.71	-6.60	-5.91
	Imports	-2.98	-1.05	0.32	0.49	0.70	0.97	1.18	1.19	0.69
in bn € 2004	Gross Domestic Product	-1.52	0.81	3.52	4.72	5.68	6.73	8.86	10.71	109.56
	Investment	-1.12	-0.44	0.27	0.45	0.58	0.70	0.90	0.87	8.95
	Public Consumption	7.81	8.16	8.58	9.04	9.52	9.83	11.78	13.76	172.55
	Private Consumption	-3.41	-0.46	2.24	2.88	3.43	4.00	5.88	8.30	70.61
	Exports	-7.84	-7.54	-7.23	-7.12	-7.07	-6.71	-8.19	-10.53	-129.21
	Imports	-3.03	-1.09	0.34	0.53	0.78	1.10	1.51	1.68	13.37

Source: GEM-E3-CAT

Table 28. Macroeconomic effects of scenario S02: Results for Catalonia

Change from reference		2015	2016	2017	2018	2019	2020	2025	2030	Cumulative 2015-2030
in %	Gross Domestic Product	-2.54	-2.67	-2.22	-1.55	-0.15	1.25	4.18	4.25	2.01
	Investment	-7.99	-8.00	-7.46	-6.64	-4.56	-2.60	2.55	2.07	-1.06
	Public Consumption	31.87	32.30	32.83	33.45	34.25	34.67	37.01	38.51	35.76
	Private Consumption	-9.54	-9.39	-8.90	-7.97	-5.06	-2.47	4.68	5.73	0.12
	Exports	-6.09	-5.64	-5.05	-4.60	-4.49	-4.25	-6.09	-7.42	-5.78
	Imports	-5.75	-4.80	-4.19	-3.58	-2.14	-0.98	1.41	1.18	-0.58
in bn € 2004	Gross Domestic Product	-4.53	-4.85	-4.10	-2.91	-0.29	2.43	9.19	10.54	67.42
	Investment	-2.29	-2.35	-2.24	-2.04	-1.44	-0.84	0.93	0.86	-5.85
	Public Consumption	9.12	9.34	9.60	9.88	10.23	10.49	12.54	14.56	185.79
	Private Consumption	-10.02	-10.09	-9.78	-8.96	-5.82	-2.91	6.25	8.65	2.47
	Exports	-7.18	-6.74	-6.13	-5.68	-5.64	-5.42	-8.73	-11.85	-126.41
	Imports	-5.85	-4.99	-4.46	-3.89	-2.38	-1.11	1.80	1.68	-11.13

Source: GEM-E3-CAT

Turning to trade, due to its strategic position, Catalonia acts as an import hub in the reference: it imports goods from the rest of the world and subsequently distributes them to the rest of Spain. Accordingly, Catalonia in the reference has a trade deficit vis-a-vis the rest of the world which is significantly offset by a trade surplus with the rest of Spain. Secession, exerts a substantial negative impact on trade intensity for Catalonia. This holds for both secession scenarios relative to the reference. This is driven by increased short term transaction costs, high risk premium, slackened demand and in the longer term by changes in competitiveness (note that neither scenario accounts for shocks from an active boycott from Spain[17]), (see Table 27 and **Table 28**). The reduction of economic activity in Spain, which is Catalonia's largest export market, accounting for more than one third of Catalan exports has a twofold impact: (i) it poses a significant downward impact on Catalan exports in both secession scenarios. (ii) it also poses a significant downward impact on imports, as the placement of the national border undermines Catalonia's role as a hub. Table 29 and Table 30 presents the exports' results by main export partner of Catalonia for scenario S01 and S02 respectively.

17. Morato et al (2014) estimates that in the extreme case of a total embargo of trade with Spain, the reduction of Catalan GDP would be 16.8%.

Table 29. Changes in Catalan exports by main export partners of Catalonia in scenario S01

	Change from reference, in %				Change from reference, in bn Euro 2004			
	2015	2020	2030	Cumulative 2015-2030	2015	2020	2030	Cumulative 2015-2030
EU28	-8.0	-6.1	-7.1	-6.7	-7.3	-5.9	-8.5	-111.5
Spain	-11.8	-8.4	-9.4	-9.1	-6.5	-5.0	-6.7	-91.4
Germany	-2.2	-2.5	-4.0	-3.1	-0.1	-0.2	-0.3	-3.5
France	-2.2	-2.4	-3.3	-2.8	-0.2	-0.2	-0.4	-4.7
Italy	-2.2	-2.4	-3.2	-2.8	-0.1	-0.1	-0.2	-2.0
Portugal	-2.5	-2.2	-2.8	-2.6	-0.1	-0.1	-0.1	-1.4
Total	**-6.7**	**-5.3**	**-6.6**	**-5.9**	**-7.8**	**-6.7**	**-10.5**	**-129.2**

Source: GEM-E3-CAT

Table 30. Changes in Catalan exports by main export partners of Catalonia in scenario S02

	Change from reference, in %				Change from reference, in bn Euro 2004			
	2015	2020	2030	Cumulative 2015-2030	2015	2020	2030	Cumulative 2015-2030
EU28	-7.5	-5.1	-8.0	-6.6	-6.9	-5.0	-9.6	-110.5
Spain	-11.9	-7.9	-10.3	-9.4	-6.5	-4.7	-7.4	-93.6
Germany	-1.0	-1.0	-4.8	-2.6	-0.1	-0.1	-0.4	-3.0
France	-1.0	-0.9	-4.1	-2.4	-0.1	-0.1	-0.5	-3.9
Italy	-0.9	-0.8	-4.0	-2.3	-0.03	-0.03	-0.2	-1.6
Portugal	-1.6	-0.9	-3.7	-2.3	-0.04	-0.03	-0.1	-1.2
Total	**-6.1**	**-4.3**	**-7.4**	**-5.8**	**-7.2**	**-5.4**	**-11.9**	**-126.4**

Source: GEM-E3-CAT

Imports of Catalonia are also below the reference scenario due to the contraction of domestic demand (Table 31 and Table 32). The negative impact on imports is more severe and lasts longer if the decision to secede is unilateral. In the mutual agreement, demand for imported goods and services deteriorates in 2015-2016, but it recovers relatively fast and it increases compared to the reference scenario later on and in particular after 2020 as Catalan income grows at high rates. Higher

wages from the reference increase household income but also increase unit labour costs, with negative impact on Catalan competitiveness. Competitiveness of domesticaly produced goods deteriorates mainly at the final years of the simulation period, (2030), with adverse effects on the trade balance (demand for imports increases whereas exports continue to deteriorate).

Table 31. Changes in imports by main import partners of Catalonia in scenario S01

	Change from reference, in %				Change from reference, in bn Euro 2004			
	2015	2020	2030	Cumulative 2015-2030	2015	2020	2030	Cumulative 2015-2030
EU28	-2.4	1.2	1.3	0.9	-1.7	1.0	1.3	12.5
Spain	-1.1	1.5	1.4	1.2	-0.5	0.7	0.8	9.9
Germany	-4.9	0.7	0.9	0.3	-0.4	0.1	0.1	0.5
France	-4.1	0.4	0.9	0.2	-0.2	0.0	0.1	0.1
Italy	-3.8	0.7	1.0	0.4	-0.2	0.0	0.1	0.3
Portugal	-3.5	1.1	1.6	0.9	0.0	0.0	0.0	0.2
Total	-3.0	1.0	1.2	0.7	-3.0	1.1	1.7	13.4

Source: GEM-E3-CAT

Table 32. Changes in imports by main import partners of Catalonia in scenario S02

	Change from reference, in %				Change from reference, in bn Euro 2004			
	2015	2020	2030	Cumulative 2015-2030	2015	2020	2030	Cumulative 2015-2030
EU28	-5.0	-0.7	1.5	-0.2	-3.7	-0.5	1.5	-3.2
Spain	-3.1	-0.4	2.1	0.4	-1.3	-0.2	1.2	2.8
Germany	-9.4	-0.7	0.6	-1.2	-0.8	-0.1	0.1	-1.9
France	-7.1	-1.4	0.4	-1.3	-0.3	-0.1	0.03	-1.1
Italy	-6.7	-1.2	0.5	-1.2	-0.3	-0.1	0.03	-0.9
Portugal	-6.9	-1.0	1.4	-0.7	-0.1	-0.01	0.02	-0.2
Total	-5.8	-1.0	1.2	-0.6	-5.9	-1.1	1.7	-11.1

Source: GEM-E3-CAT

3.5.3. Labour Market

The additional (to the reference) budget used for government spending and investment in infrastructure, as well as the need to set up structures previously centrally provided by Spain stimulates employment in Catalonia. The unemployment rate in Catalonia falls in both the mutual agreement and the unilateral scenario, compared to the reference scenario (Table 33), initially only marginally but more firmly over time. The increase in labour demand exerts upward pressure on the labour costs in Catalonia (real wages increase under secession compared to the reference scenario) which in their turn harm the competitiveness of the Catalan economy. This is visible mainly in the period 2020-2030 where Catalonia registers low unemployment rates already in the reference case. Hence the potential of labour supply to adjust to higher labour demand is limited and wages increase.

At low unemployment rates the additional demand for labour has a strong effect on wages. However If additional labour force (i.e. through migration) was available the stress on wage rates would be lower and hence the

effects on competitivenes moderate. Sensitivity analysis with the GEM-E3-CAT model showed that in the case where wages remained at the reference levels by increasing labour supply (attracting workers from other EU countries) the net benefit for the Catalan economy would be significant (almost 5% of GDP) while the number of additional labour force required would be 400,000 workers.

Table 33. Employment and labour market effects of scenario S01

Change from reference, in %		2015	2016	2017	2018	2019	2020	2025	2030
Catalonia	Employment (in m. persons)	0.77	1.91	3.21	3.80	4.23	4.55	4.56	3.37
	Unemployment rate*	-0.61	-1.52	-2.58	-3.08	-3.47	-3.77	-4.02	-3.13
	Real Wage (Man Hour)	0.38	0.81	1.33	1.66	1.99	2.29	4.12	7.40

Source: GEM-E3-CAT
*change in percentage points

Table 34. Employment and labour market effects of scenario S02

Change from reference, in %		2015	2016	2017	2018	2019	2020	2025	2030
Catalonia	Employment (in m. persons)	0.04	-0.09	0.32	0.90	2.03	3.07	4.86	3.45
	Unemployment rate*	-0.03	0.07	-0.26	-0.73	-1.67	-2.54	-4.28	-3.20
	Real Wage (Man Hour)	0.19	0.24	0.39	0.61	1.08	1.60	4.54	8.01

*change in percentage points
Source: GEM-E3-CAT

3.5.4. Sectoral production

Changes in domestic production in Catalonia in the secession scenarios are the joint result of changes in productivity, changes in competitiveness of the products produced, changes in domestic demand due to increased government spending and investment in infrastructure and changes in trade, which are adversely affected from secession.

Domestic production in Catalonia responds to the shock induced by secession in both the mutual agreement and unilateral action scenarios with contractions as compared to the reference scenario (see Table 35 and Table 355 for scenario S01 and S02 respectively). The contraction is stronger in secession under unilateral action in most sectors. Domestic production recovers later on in the period of study with the effects being higher for the sectors providing inputs to investments in infrastructure and government spending, such as construction and non-market services. Changes in the competitiveness of the Catalan products and demand for exports affect mainly the production of relatively labour intensive sectors (like the services sectors) which manage to recover and in some cases exceed their reference scenario production levels.

Table 35. Domestic production in Catalonia in Scenario S01								
	Change from reference, in %				Change from reference, in bn Euro 2004			
	2015	2020	2030	Cumulative 2015-2030	2015	2020	2030	Cumulative 2015-2030
Agriculture	-4.5	-2.4	-1.0	-2.3	-0.2	-0.1	0.0	-1.5
Energy sector	-3.0	-0.7	0.4	-0.6	-0.3	-0.1	0.1	-1.0
Food products and beverages; Tobacco	-5.4	-3.3	-1.5	-3.1	-1.1	-0.7	-0.4	-11.6
Textiles	-7.1	-5.5	-8.9	-6.8	-0.4	-0.3	-0.4	-5.3
Pulp, Paper and Non metallic minerals	-6.0	-3.0	-4.9	-3.9	-0.5	-0.3	-0.5	-6.1
Basic metals	-6.1	-4.0	-3.1	-4.1	-0.2	-0.1	-0.1	-1.9
Chemicals	-6.2	-4.9	-5.9	-5.5	-1.3	-1.2	-1.6	-21.2
Fabricated metal products, except machinery and equipment	-5.5	-2.6	-4.2	-3.5	-0.4	-0.2	-0.4	-4.9
Machinery and equipment goods	-6.2	-4.5	-8.1	-5.9	-0.7	-0.5	-1.3	-12.8
Electric goods	-5.1	-3.9	-2.7	-3.8	-0.1	-0.1	-0.1	-1.4
Transport equipment goods	-7.5	-3.7	-2.9	-3.7	-1.0	-0.5	-0.6	-9.8
Other equipment goods	-5.8	-2.4	-3.7	-3.3	-0.2	-0.1	-0.2	-2.3
Construction services	0.5	6.0	5.5	5.3	0.1	1.7	2.0	26.5
Trade services	-3.5	1.1	1.7	0.8	-2.3	0.8	1.5	10.3
Transport services	-3.5	-1.2	-1.7	-1.6	-0.7	-0.3	-0.5	-6.2
Financial intermediation services	-3.3	0.3	-2.7	-1.0	-0.3	0.0	-0.4	-1.9
Other business services	-3.0	1.2	0.6	0.6	-1.6	0.7	0.5	6.5
Rest of Market services	-0.3	3.7	3.5	3.2	0.0	0.4	0.6	6.7
Recreational services	-2.6	2.6	2.3	1.9	-0.3	0.3	0.3	4.0
Non market services	16.8	21.9	25.2	22.5	5.5	7.7	11.1	136.1

Source: GEM-E3-CAT

Table 36. Domestic production in Catalonia in Scenario S02								
	Change from reference, in %				Change from reference, in bn Euro 2004			
	2015	2020	2030	Cumulative 2015-2030	2015	2020	2030	Cumulative 2015-2030
Agriculture	-4.8	-2.8	-1.5	-2.8	-0.2	-0.1	-0.1	-1.9
Energy sector	-3.7	-1.6	0.3	-1.2	-0.3	-0.2	0.0	-2.0
Food products and beverages; Tobacco	-5.6	-3.4	-2.0	-3.4	-1.1	-0.8	-0.5	-12.9
Textiles	-6.6	-4.6	-9.9	-6.8	-0.4	-0.2	-0.4	-5.3
Pulp, Paper and Non metallic minerals	-6.7	-3.6	-5.6	-4.7	-0.6	-0.3	-0.6	-7.2
Basic metals	-5.7	-3.2	-3.6	-4.0	-0.2	-0.1	-0.1	-1.8
Chemicals	-5.8	-4.2	-6.8	-5.5	-1.2	-1.0	-1.8	-21.4
Fabricated metal products, except machinery and equipment	-5.7	-2.4	-5.1	-3.9	-0.4	-0.2	-0.5	-5.4
Machinery and equipment goods	-5.7	-3.4	-9.3	-6.0	-0.6	-0.4	-1.5	-12.9
Electric goods	-3.9	-2.3	-3.6	-3.4	-0.1	0.0	-0.1	-1.2
Transport equipment goods	-8.1	-2.3	-3.5	-3.5	-1.0	-0.3	-0.7	-9.2
Other equipment goods	-6.4	-2.8	-4.6	-4.0	-0.2	-0.1	-0.2	-2.8
Construction services	-3.2	1.6	5.4	2.9	-0.8	0.5	2.0	14.3
Trade services	-6.6	-2.7	1.5	-1.4	-4.3	-2.0	1.4	-17.4
Transport services	-4.5	-2.4	-1.9	-2.4	-0.9	-0.5	-0.5	-9.2
Financial intermediation services	-5.4	-2.3	-3.4	-2.7	-0.5	-0.2	-0.5	-5.0
Other business services	-5.4	-1.4	0.3	-1.0	-2.9	-0.8	0.2	-10.1
Rest of Market services	-2.5	0.8	3.3	1.6	-0.3	0.1	0.5	3.3
Recreational services	-5.8	-1.7	2.3	-0.4	-0.6	-0.2	0.3	-0.9
Non market services	19.6	22.4	27.0	23.9	6.5	7.9	11.9	144.5

Source: GEM-E3-CAT

3.5.5. Alternative uses of public funds

As discussed in the previous sections the Catalan government would have an additional budget to invest. In the base setting of the scenarios its has been assumed that the government would have a balanced budget and use the additional funds so as to increase public consumption and to reduce labour costs (the split of the budget between the two options has been assumed to be equal). In this section we study alternative uses of the public funds in order to identify the most efficient use in stimulating economic activity. Three cases have been considered: i) reduction of indirect taxes , ii) reduction of employers social security contributions and iii) increase in public spending.

The table below presents the results for GDP and its components for each scenario. The results indicate that among the three options considered, the reduction of indirect taxes is found to be most beneficial througout the simulation period (2015-2030). Increasing public expenditure is more effective than reducing labour costs in the short run and up to 2019. This can be explained as follows: the higher unemployment rate up to 2020, implies that labour supply is flexible in meeting additional demand for labour with a minimum effect on labour costs. Thus, competitiveness is not undermined. However when unemployment reaches almost 7% (in 2030) it is preferable to reduce labour costs in order to increase the competitiveness of the economy and not to put any pressure on wages; thus in the long term reducing employers social security contributions becomes more effective in stimulating activity compared to increasing public expenditure.

Table 37. Macroeconomic impacts from alternative uses of public funds

S01		Government consumption			Social Security			Indirect taxes		
Change from reference		2015-2020	2021-2030	2015-2030	2015-2020	2021-2030	2015-2030	2015-2020	2021-2030	2015-2030
in %	Gross Domestic Product	1.84	3.78	3.13	1.73	4.22	3.39	3.16	6.26	5.23
	Investment	0.25	2.13	1.51	0.23	2.43	1.70	1.67	4.63	3.65
	Public Consumption	32.98	41.97	38.91	27.03	27.76	27.51	27.03	27.76	27.51
	Private Consumption	1.55	5.15	3.96	1.06	4.00	3.03	2.98	8.04	6.37
	Exports	-6.84	-8.80	-8.14	-4.99	-3.10	-3.74	-3.62	-2.19	-2.67
	Imports	-0.29	0.77	0.42	-0.13	1.51	0.96	1.35	3.89	3.04
in bn € 2004	Gross Domestic Product	20.55	84.20	104.75	19.28	94.04	113.32	35.36	139.62	174.97
	Investment	0.46	7.93	8.40	0.41	9.02	9.43	3.05	17.21	20.26
	Public Consumption	58.21	143.95	202.16	47.71	95.23	142.94	47.71	95.23	142.94
	Private Consumption	10.32	69.82	80.14	7.05	54.25	61.31	19.91	108.97	128.88
	Exports	-50.35	-127.67	-178.02	-36.73	-45.00	-81.73	-26.60	-31.73	-58.33
	Imports	-1.90	9.94	8.04	-0.84	19.46	18.62	8.71	50.11	58.82
S02		Government consumption			Social Security			Indirect taxes		
Change from reference		2015-2020	2021-2030	2015-2030	2015-2020	2021-2030	2015-2030	2015-2020	2021-2030	2015-2030
in %	Gross Domestic Product	-1.21	3.33	1.81	-1.36	3.92	2.16	1.84	6.55	4.98
	Investment	-6.16	1.23	-1.21	-6.11	1.62	-0.93	-3.04	4.45	1.98
	Public Consumption	39.46	46.36	44.01	27.03	27.76	27.51	27.03	27.76	27.51
	Private Consumption	-6.72	4.45	0.76	-7.52	2.96	-0.50	-3.90	8.17	4.18
	Exports	-6.96	-10.00	-8.98	-3.08	-2.51	-2.70	0.53	-1.33	-0.71
	Imports	-3.76	0.40	-0.99	-3.27	1.38	-0.17	-0.09	4.45	2.93
in bn € 2004	Gross Domestic Product	-13.47	74.19	60.73	-15.22	87.49	72.28	20.59	146.14	166.73
	Investment	-11.26	4.57	-6.68	-11.17	6.03	-5.14	-5.56	16.55	10.99
	Public Consumption	69.63	159.01	228.64	47.71	95.23	142.94	47.71	95.23	142.94
	Private Consumption	-44.87	60.31	15.44	-50.24	40.15	-10.08	-26.05	110.67	84.62
	Exports	-51.21	-144.98	-196.19	-22.63	-36.34	-58.96	3.87	-19.33	-15.46
	Imports	-24.24	5.15	-19.09	-21.11	17.79	-3.32	-0.61	57.36	56.75

Source: GEM-E3-CAT

3.6. Conclusions

Catalan secession from Spain as quantified by the GEM-E3-CAT model is beneficial for Catalonia in all cases examined, reflecting to a large extent the positive impact from terminating Catalonia's net fiscal transfers to the rest of Spain. In the short run uncertainty, high interest rates and a volatile investment environment triggered by the decision to secede is found to slow the Catalan GDP growth rate; the effect is more pronounced if the decision to secede is unilateral. However the structure of the Catalan economy and the pursuit of fiscal policy towards a balanced public budget can deliver higher than the reference GDP and employment growth rates, once the transition period to sovereignty is over.

The overall net effect from secession on the Catalan economy is the result of a multitude of short and long run adjustments with frequently opposing effects. Below we describe the key mechanisms that drive the adjustment process:

Short run

i) The change of the fiscal imbalance between Spain and Catalonia benefits the Catalan economy due to the increased public investment and its economy wide multiplier effects. Stock addition and upgrade of infrastructure stimulates mainly domestic production since the additional demand is addressed to domestic activities (for instance construction).
ii) Higher domestic production lowers unemployment without exerting significant pressure to the wages, as unemployment is still at high levels.
iii) The decision to secede creates uncertainty and increases market interest rates and the risk premium.

Long run

i) The increased infrastructure capacity increases economy wide productivity improving the overall competitiveness of the economy.
ii) Additional public spending reduces unemployment but may deteriorate competitiveness as upward pressure is exerted on wages.
iii) Uncertainty is reduced and **interest rates** become lower than the reference as the fundamentals of the Catalan economy are strengthening (sustainable debt, balanced public budget and low unemployment).

Overall the positive effects induced by additional productivity and better public finances are only moderated by a loss in competitiveness induced by higher wages (depending on how the additional fiscal revenue remaining in the region is allocated). Different assumptions on public spending and fiscal policy were examined as these could lead to different short run and long run adjustments. It has been found that reduction of indirect taxes is the most beneficial option in terms of GDP. Increasing public expenditure is preferred in the short term whereas in the longer term when low unemployment rates prevail it is preferable to reduce labor costs. As expected Catalonia benefits more under mutual agreement on secession as the lower uncertainties and risks associated with secession in this case allow for a faster recovery of the economy from the shock of independence from Spain.

4. PART 2: PATHS FOR CATALONIA AS AN INDEPENDENT EUROPEAN STATE

4.1. Scenarios for independent Catalonia relations with the EU under a Status-quo European Union

"Paths for Catalonia's integration in the European Union" was the title of a recent (April 2014) report from the Generalitat of Catalonia analyzing the possible scenarios for Catalonia-EU relations after the declaration of independence. According to this study, the Generalitat of Catalonia will have different scenarios to consider, and eventually decide which of the scenarios best answer its (policy) interests.

Seven options are identified:

- **Internal Enlargement options**, whereby the new Catalan state continues to be part of the EU, without any break (permanence option) or with a short break and then re-admission of the Catalan state in the EU (with two options: ad hoc fast track accession and ordinary accession).
- **Bilateral Agreements**, whereby the new Catalan state is kept outside the EU and enters in bilateral agreements with the EU itself (with three options: trade agreements, cooperation agreements, and association agreements).
- **EEA Membership**, whereby the new Catalan state is kept outside the EU but is associated to EFTA Treaty with Iceland, Liechtenstein, Norway and Switzerland and enters into the EEA agreement with the EU.

Each option would require to plan and to implement a process of transition, to establish the new independent state relationship with Spain, with the EU and with the rest of the world. The consequences that could arise from applying each of the options are to be taken into account so that the new Catalan state can adopt the right strategies for maintaining as far as possible: 1) the favourable economic and commercial relations that exist today; 2) the application of European law. It is important to note that all the options consider the current state of the European Union polity.

The political rationales and possible legal procedures are illustrated below for each of the 8 options.

1. Permanence in the EU

This is the option more extensively explored in the study of the Generalitat of Catalonia. It would entail a smooth transition process that in practice would continue the current state of integration of Catalonia, and it would surely be the most favorable option for the new Catalan State. The option is more realistic in a framework of mutual agreement with Spain (which is the framework considered in Part I of this report for the S01 scenario), but it is considered feasible also in the case of unilateral independence declared by Catalonia without the agreement of Spain. Although currently the European Commission has not taken an official position towards the independence of Catalonia – as this is considered an internal affair of a member state (Spain) - the unofficial opinions manifested by several European Commission politicians are against independence, as the whole issue is considered an inconvenient and disturbing factor in the EU intra-state equilibrium (a political case not a legal one). If the Catalan territory will separate from Spain – it is argued - it will be automatically out of the Treaty, which is an international pact between sovereign member states. However, there are reasons to think that is a matter of political will for taking a more or less pragmatic approach –the so-called pragmatic exceptionalism rule- towards the issue, because it is evident that – besides what the governments deliberate – there is the reality of Catalonia for the past 30 years observing the EU legislation (the acquis communautaire and the Catalans being currently European citizens beyond (or in some interpretations even before) being Spanish citizens. Any unilateral independence will produce – from the citizens' perspective – the paradox of remaining European citizens as they hold the Spanish passport (which the Spanish rulers cannot revoke if they do not recognize Catalonia as an independent state).

By the way, in the seemingly more realistic case of Catalonia unilateral instead than agreed independence, as the birth of a new state is a matter of fact rather than of law, the decision to recognize a state as a subject of international law is essentially political. The recognition can take place officially, through a formal ad hoc act, or else implicitly and tacitly, through the signing of conventions and treaties with another state or also accepting its incorporation in an international or supra-state organization. In this respect, the EU could be the first organization to implicitly though unequivocally recognize this fact (although of course prior recognition by other states or other international organizations – e.g. UN - would streamline the process of joining the EU).

The consequence is that the procedures for remaining in the EU could and should be begun by the new Catalan state once it has been constituted as such, after a unilateral declaration of independence. A process of negotiation would then begin to adapt the primary law and secondary law to the presence of a new Member State and to establish the internal adaptations Catalonia would have to make in order to continue as part of the EU. Specific modifications of the Treaties would be required, such as the incorporation of the name of the new Member State, the modification of the precepts establishing the participation of the new state in some of the EU institutions, or the mention of Catalan as one of the languages of the Treaties. These minor modifications would have to be made in accordance with the procedure for amending the Treaties foreseen in Art. 48 TEU, and in particular the ones regulated in sections 2 to 5 for ordinary revision of the Treaties.

More in detail, the ordinary procedure for revising the Treaties can be begun by the government of any member state, by the European Parliament or by the Commission by submitting a proposed revision of the Treaties to the Council, which forward it to the European Council and notifies the national Parliaments (Art. 48.2 TEU). The European Council, after consulting the European Parliament and the Commission, adopts by a simple majority a decision in favor of beginning the amendment procedure. If passed, it orders the Council to convene an Intergovernmental Conference, that has to approve by consensus the amendments to be introduced into the Treaties, and these amendments must then be ratified by all member states. The procedures is characterized by some margin of maneuver: for one thing, no particular qualified majority is set for adopting decisions allowing the start of the amendment process and, for another, it foresees the possibility of finding mechanisms to provide a way out of possible opposition or obstruction on the part of a member state.

The amendments that would have to be introduced into European secondary law would be of limited scope, as they would refer to legislation that could be directly affected by the accession of a new member state (e.g. legislation on agriculture policy which establishes quotas for milk production) and would come about through amendments to the corresponding directives and regulations.

As it regards the internal adaptations Catalonia would have to make, some of these would affect the bodies that would have to be created or adapted and others would affect the regulations required to develop and apply European law and the indispensable transitional measures.

Finally, the EU could adopt transitional measures in order to ensure the practical effectiveness of recognizing the permanence of a future Catalan state in the EU from the moment this recognition take place and for the duration of the process of amending the Treaties and adapting secondary law and internal law.

2. Fast accession track

In this option the new Catalan state will be obliged to leave the EU, but the process of re-accession would be streamlined, with the adoption of transitional ad hoc simplifying measures aimed at speeding entry and ensuring that the bulk of the European legislation currently applicable continues to be applied to the Catalan territory and citizens while the process lasts. According to the speed of this ad hoc procedure and according to the content and duration of the transitional regime, in practice the consequences of this entry procedure for the future of the Catalan state could objectively be almost identical to those of the first option.

A possible ad hoc transitional solution could consist in continuing to apply European law throughout Catalonia, even though only the rest of Spain would continue to be a member of the EU. As pointed out in a recent study of the political scientists Kai-Olaf Lang (…), this would be an "inverted Cyprus solution". In the case of Cyprus, the application of the Treaties is suspended in the North of the island (the Turkish Cyprot part), although it was considered part of the EU, while in the case of Catalonia application of the Treaties and of European legislation could be maintained while it temporarily is not part of the EU.

The legal procedure for the re-admission is laid down in Article 49 TEU. This begins with the application for entry submitted to the Council, who would have to accept it unanimously after consulting with the Commission and with the European Parliament. It is important to stress that unlike the procedure in Article 48 TEU – evoked above for the EU permanence option – that in principle would require decisions to be taken on simple majority basis, no mechanism is foreseen here for a response on the part of the EU in the face of possible obstruction (e.g. from the Spanish state). Unanimous consensus is needed for accession, and this means that – in case of unilateral declaration of independence and continued opposition of Spain – this option is far less realistic than permanence (the latter we remind may be realistic if the EU will take a pragmatic attitude and the majority of the member states will agree to amend the Treaty)

However, should re-admission be agreed in the Council, a process of negotiation of uncertain duration would open, even though would have to be shorter than the ordinary process followed up till now with other countries recently incorporated into the Union. This precisely because the ad hoc procedure acknowledges the more limited amendments required by the provisions of primary law and secondary law and the reduced demands arising for Catalonia. For example, it should be reminded that Catalonia since the accession of Spain in 1986 is already a net contributor to the EU.

The legal instrument in which this negotiation would be carried out would be the Treaty or Deed of Accession of Catalonia to the EU, which would include the principles governing the accession, adaptations of an institutional nature, technical adaptations of secondary law, secondary measures in the different material spheres and the actual rules for applying the Deed.

The Commission directs the negotiations and duly informs the Parliament and the Council. The terms agreed for the different matters under negotiation are described in the Treaty of Accession and, before proceeding to sign it, it must have a statement of approval from the Parliament – adopted by an absolute majority of its members – and the unanimous agreement of the Council. Once this Treaty has been signed by the member states and by the candidate country, it undergoes the corresponding ratification according to internal constitutional rules.

3. Ordinary accession

In this option, the new Catalan state would be treated as a third state, outside EU, ignoring the fact that the Catalonian territory and citizens have belonged to the Union for almost thirty years, and placing Catalonia in the same position as those states now officially declared candidates for entry, such as Iceland, Turkey, Macedonia, Montenegro or Serbia. In the Catalan case, this option would undoubtedly have a clear element of punishment or dissuasion. Such procedure, though, it was not implemented for the reunification of East and West Germany which brought East Germany into the Community without increasing the number of member states. However, even in this case,

during the negotiation for entry, transitional measures could be taken to allow continuity of the application, at least in part, of European law. The application of transitional regimes is common in most entry processes, and in the case of the new Catalan state could take the form of bilateral agreements to be established until the entry of the new Catalan state in the EU.

The procedural rules applicable in this third scenario for entry are also the ones foreseen in Article 49 TEU, but in this case, unlike the rapid accession scenario, without any modulation allowing the process to speed up or temporarily guaranteeing the continuation of pre-existing legal situations.

In an initial stage, the EU would evaluate the Catalan candidacy's fulfillment of the requirements foreseen and the criteria for eligibility and, in the case of being accepted as a candidate, talks would begin to establish the conditions of accession. The full EU accession process includes the following major milestones:

- negotiating and signing of the Accession Agreement (AA) and Free Trade Association (FTA), which includes political and legal provisions for starting the EU accession process;
- formal EU membership application;
- obtaining EU candidate status;
- opening membership negotiation;
- concluding membership negotiation;
- signing accession treaty;
- ratification of the accession treaty and entering the EU
- post-accession monitoring (Cooperation and Verification Mechanism)
- post-accession transitory periods, Schengen accession, EMU accession.

The whole process is not clear for how long will require to be completed. However, it is clear that, being the Catalan territory already included in the EU, the Schengen zone and the Eurozone, to require all these steps for the new Catalan state would be really artificial, and moreover subject (since the first step, indeed) to the possible veto of Spain, as well as of other member states fearing secessions in their territories. Equally the EU may take a more pragmatic resolution towards Catalonia if they foresee indefinition as a clear obstacle to the Union's common interests and policy objectives.

4. Bilateral agreements

In this option the EU refuses to begin talks for entry by the new Catalan state, either because it is unwilling to acknowledge Catalonia as a state (contrary to what is assumed for the permanence in the EU scenario) or because negotiations for membership of the Union have been blocked (making either rapid or ordinary scenarios impossible).

An argument to refuse negotiation, if the separation takes place without the agreement of the Spanish State and outside the current Spanish law, is that the incorporation of the future independent Catalan state in the EU would violate the principle of national identity

and, especially, the principle of territorial integrity foreseen in Art. 4.2 TEU. This article establish, first of all, that the EU must respect the equality of the member states under the Treaties, as well as their national identities, inherent in their fundamental structures, political and constitutional, inclusive of regional and local self-government. In addition, it is foreseen that the Union must respect the essential functions of states, particularly those whose object it is to guarantee the territorial integrity, maintaining law and order and safeguarding national security. Finally, this article also states that national security remains the sole responsibility of each member state. However this article should be interpreted, something sometimes oddly ignored, in the light of Art. 2 which states that the democratic principle should always prevail in the actions of both the member states and the EU.

Accordingly, the implications of Art. 4.2 provision are very much opened to interpretation. The article does not forbid any process of internal secession in a member state per se, but merely establishes the Union's commitment to maintain a neutral status before territorial disputes in its member states, as this sphere comes under the competences exclusive of the member states. Of course, respect for the principle of territorial integrity also forms part of international public law and affects relations between states, but not situations that may arise within a given state. Only an act taking place with the use of undue force, against democratic principles or violating other obligatory rules of international law could be considered contrary to this legislation.[18]

By the way, the exclusion option may open several possibilities, being an incentive for Catalonia to push through an ambitious plan to find a new position and rolein its commercial, political and socio-economic relations, which would have to be reconsidered not only with regard to the EU itself, but, very especially, with regard to other states outside the EU.

As a matter of fact, the EU has in recent decades established a large number of bilateral agreements with third states. These agreements are of three types, depending on the content and the subjects they include: **trade agreements, association agreements and cooperation agreements**.[19]

Based on its own external competences, the EU can conclude a wide range of international agreements with third states not belonging to the EU and with international organizations. Truly "European agreements" are drawn up solely by the EU, while "mixed agreements" are drawn up by the EU and the member states together. Due to the difficulty of drawing the precise limit between the external competences of the EU and those of its member states, the use of mixed agreements has been common practice in the Union. In practice, it would be important for Catalonia to know which instruments could make it possible to maintain links and agreements with the Union without requiring unanimity among member states. If a bilateral agreement (one for cooperation or association) includes a single provision on a topic requiring unanimity, the whole agreement will require the unanimous decision of the Council. By the same token, if it includes a provision that affects a competence of the member states it will have

18. In any event, as mentioned, the exclusion option would create a paradoxical situation. If Spain does not recognize the Catalan independence, this would prevent the modification of the area of application of the EU Treaties in the Catalan territory. As a result, the European law would be in force and applicable for Catalonia and the Catalans, even though Catalonia might already have declared independence and might have started to act as an independent state.

19. The EU and Switzerland, for example, have a large number of bilateral agreements thanks to which the latter can enjoy the benefits of the single market without being a member of the EU and, at the same time, maintain a high degree of economic and political autonomy, especially as regards the economy, taxes, trade and agriculture. Indeed, the agreements concluded do not foresee a harmonisation of taxes nor of customs tariffs towards third countries. Being left out of European trade policy, Switzerland can conclude whatever agreements it considers convenient with third countries.

to be adopted as a mixed agreement, which will have to be accepted both by the EU and by the different member states. In the case of Catalonia, we need therefore to weigh up the possibility of extending the adoption of an agreement on trade, cooperation or association with the EU as far as possible, but at first, if it were necessary to avoid vetoes, matters requiring a unanimous decision or that are the competence of member states could not be included.

Different options of bilateral agreements between the new Catalan state and the EU may be considered.

4a) Trade agreements with the EU

The EU enjoys extended exclusive competences about trade. It can, for example, adopt European agreements covering the entire scope of trade policy, i.e. tariff modifications, trade agreements on goods and services, commercial aspects of intellectual and industrial property, direct foreign investment, uniformity in liberalization measures, export policy, etc. Consequently, it can include provisions on most favored nation treatment with regard to taxes and internal regulations, as well as on the suppression of unnecessary obstacles to free trade. Similarly, the EU has sole competence over the area of services, a competence including access to and liberalization of certain investments in relation to third country markets. Although trade agreements are the sole competence of the Union and cover the sphere of common commercial policy foreseen in Art. 207 TEU, their particular drafting procedure has been integrated in the general procedure for concluding international agreements in Art. 218 TEU. Decision-making by qualified majority is the general norm, but the TEU foresees specific, exceptional cases in which the Council has to pronounce by unanimity. This happens in the sphere of trade in cultural and linguistic diversity of the Union. Unanimity is also required in the sphere of social, educational and health services, in those cases where these agreements could seriously disturb the national organization of these services and undermine the responsibility of member states providing them.

The procedure by which these agreements are adopted is as follows: the Commission, having submitted its recommendations to the Council, receives a mandate from the Council to negotiate the proposal with the third state. The Commission carries out the negotiations with the commitment to keep the Council (more specifically, a special Trade Committee) and the European parliament duly informed regarding the progress of the talks. When negotiations have ended, the Council concludes the trade agreement and, if its content can be approved by a qualified majority[20], no state can place obstacles to its conclusion.

4b) Cooperation agreements

Cooperation agreements make for closer collaboration in various spheres going beyond the framework of trade policy. The scope of the cooperation can vary; for example, it can be commercial, economic, fi-

20. It is important to note that the Council voting system has been modified to make it easier to take decisions. The qualified majority system (triple majority: votes, states and population) established in the Treaty of Nice has been replaced by a double majority system (states and population) established in the Treaty of Lisbon. Under the new system there is a qualified majority when agreement is reached among 55% of member states and 65% of the European population.

nancial, technical, for research, fishing or development. Cooperation agreements, for their part and depending on the content, can be the exclusive competence of the Union or a shared competence (EU and states). The agreements are adopted by the Council and the European Parliament in accordance with the ordinary legislative procedure (Article 218 TFEU), which requires only a qualified majority.

4c) Association agreements

The most ambitious exterior agreements the EU concludes are the association agreements. Special and privileged cooperation established by means of these agreements is made manifest in the content and aims and in its degree of institutionalization. The association agreements (Art. 217 TFEU) also follow the procedure in Art. 218 TFEU and require the consent of the European Parliament in order to be adopted by the Council. Practice has shown that association agreements have usually been concluded as mixed agreements, the contracting parties being the EU and the member states, and their coming into force tends to be delayed by the requirement of parliamentary ratification by each state at an internal level. However, since the Treaty of Lisbon, Community association agreements can be concluded exclusively by the EU – and not by its member states – with a qualified majority, if the spheres dealt with in the agreement did not call for unanimity.

5. EEA membership

The **European Economic Area (EEA)** is a comprehensive multilateral cooperation arrangement that is now associating three European Free Trade Association (EFTA) countries – Norway, Iceland, Liechtenstein – with the EU member states.

The European Economic Community (EEC) was founded in 1957 with the Treaty of Rome, signed by six European countries, i.e. Belgium, France, Germany, Italy, Luxembourg and the Netherlands. The external ring of EEC neighborhoods founded the European Free Trade Association, whose scope was limited to establishing a free trade area and it did not have ambitions of proceeding with deeper institutional and political integration, like a customs union and the creation of supranational institutions. The Stockholm Convention of 1960 was signed by seven founding members of the EFTA: Austria, Denmark, Norway, Portugal, Sweden, Switzerland and the UK. Finland joined the EFTA in 1961, Iceland in 1970 and Liechtenstein in 1991. However, several EFTA members gradually applied for EEC and EU membership (UK, Ireland and Denmark in 1973; Portugal in 1986; Austria, Finland and Sweden in 1995). As a result, after the 1995 EU enlargement, the EFTA was left with four members, i.e. Iceland, Liechtenstein and Switzerland (in Norway the EU membership was rejected by popular referenda).

In the beginning of the 1990s, the EU and EFTA members negotiated the EEA agreement which was signed in Porto on May 2, 1992 by all 12 members of the EU at that time (Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal,

Spain, UK) and six EFTA members (Austria, Finland, Iceland, Norway, Sweden and Switzerland).[21] The EEA Agreement entered into force on January 1, 1994. A year later, three EFTA members (Austria, Finland and Sweden) joined the EU but as EU members, they remained within EEA. The Principality of Liechtenstein joined the EEA on May 1, 1995. All subsequent EU enlargements (2004, 2007 and 2013) resulted in a respective enlargement of the EEA. Now the EEA consists of **31 member countries**.[22]

The EEA agreement includes 129 articles, 22 annexes and 49 protocols. The Agreement has a dynamic character, i.e. it includes not only the initial stock of EU regulation related to the Single European Market (SEM) at the moment of its signing (1992) but also a mechanisms for incorporating the new ones.

Generally, EEA members accept EU legislation in respect to its four freedoms, i.e. the free movement of goods, services, persons and capital, as well as competition and state aid rules. The EEA Agreement also covers several so-called horizontal policies such as consumer protection, company law, environment, social policy, and statistics as well as flanking policies such as research and technological development, education, training and youth, employment, tourism, culture, civil protection, enterprise, entrepreneurship and small and medium-sized enterprises. The EEA Agreement guarantees equal rights and obligations within the SEM for citizens and economic operators from the EEA.

There is also close cooperation between EEA EU and EEA EFTA members in several important policy areas such as development aid outside the EEA and support to those EEA EU members which represent below average levels of GDP per capita. In parallel to EU cohesion and structural funds, the EEA EFTA countries offer social and economic development funding (joint EEA Grants and, in addition, Norway Grants). The EEA EFTA countries also joined several EU programs (such as the Seventh Framework Program and Horizon-2020 in research or Marco Polo – Transport) and EU agencies (like the European Aviation Safety Agency or European Environmental Agency).

On the other hand, the EEA Agreement does not cover the common agriculture and fisheries policies (although it contains provisions on trade in agricultural and fish products), customs unions, common external trade policy, common foreign and security policy, justice and home affairs (although the EEA EFTA countries belong to the Schengen area), direct and indirect taxation, and the economic and monetary union.

Summing up, the EEA Agreement provides for a far-going although incomplete integration of the EEA EFTA countries into the SEM and several accompanying policies. The EEA Agreement is clearly based on two pillars: on one hand the 28 EU member states and, on the other, the 3 EFTA countries forming part of the EEA. The EEA's institutions and decision-making process have to reflect constitutional differences between its EU and non-EU members. While EU membership involves the delegation of several competences (primarily but not exclusively related to economic policy) to the supranational bodies (the European

21. However, the Swiss voters rejected the EEA Agreement in a referendum on December 6, 1992, which forced both the EU and the Swiss government to look for alternative legal solutions, establishing bilateral agreements.

22. As for July 2014, Croatia was awaiting the completion of the ratification process of its EEA accession and already provisionally applying EEA rules. In 2009, Iceland submitted an EU membership application and the EU Council granted Iceland candidate status and opened accession negotiation in July 2010. However, after general elections in April 2013, the new coalition government and parliamentary majority suspended the EU accession process.

Parliament, Council of Ministers, European Commission, European Court of Justice), the EFTA members have been reluctant to relinquish this decision-making authority and this is the main reason they have chosen to stay outside the EU. Consequently, the decisions within the EEA must be taken by consensus and the EEA governing bodies have only consultative competences. Indeed, the EEA's institutional system is quite complex and requires participation in the different institutions set up in this framework: the EEA Council, the EEA Joint Committee, the EFTA Surveillance Authority and the EFTA Court. The EEA Joint Committee, along with the Secretariat, is the body that works to apply EU rules to the other three members of EFTA. In this way, EFTA countries taking part in the EEA apply European rules on the internal market and enjoy economic freedom without taking part in decision-making processes at EU level.[23]

In order to become member of the EEA, a new Catalan state must first become a member of EFTA organization. In order to join EFTA unanimous agreement of the members - Iceland, Liechtenstein, Norway and Switzerland - is needed, but de facto Norway has traditionally played a key role in the negotiations for entry in the new states. A formal entry application to the EFTA Secretary is required. Looking at the economic characteristics and size of Catalonia, it does not seem that there could be too many obstacles to its membership in the organization. In fact, EFTA shows a preference for small or medium-sized states, with a similar level of development and a wish to open up to the exterior, characteristic already present in Catalonia today.

In addition, it is important to note that all EFTA members form part of the Schengen Area, an area in which internal border controls have been eliminated and community rules are applied in the control of external borders. Without being a member of the EU, but by entering EFTA, Catalonia could be therefore returned to be a member of the Schengen Area. But to accomplish this, Catalonia would have still to fulfill a series of requirements in relation to external borders, demonstrating to other members that it can maintain efficient control over its borders and correct application of the Schengen regulations.

As mentioned, only after Catalonia has joined EFTA, it would then be time to consider possible subsequent accession to the EEA by application to the EEA Council. Joining the EEA is considered a mixed agreement that requires not just the approval of the European Parliament and a qualified majority of the Council, but also ratification by the 28 member states, although interim or provisional formulas for applying this Treaty could be found.

Finally, the seven options, their feasibility, and the relation with the two macroeconomic scenarios discussed in Part 1 are summarized in the following table.

23. Ironically, the EEA EFTA countries which do not want to join the EU because of their sovereignty concerns enjoy less actual sovereignty in several important economic policy areas related to the SEM as compared to EU member countries which participate in the EU legislation process with full voting rights.

Catalonia-EU cooperation options	Feasibility	Relation with the macroeconomic scenarios
1. Permanence of EU membership	This scenario is clearly feasible in case of mutual agreement with Spain, which is currently not an option. More controversial is the feasibility in case of unilateral secession. In principle, if there is the political support of the European Union institutions and of a majority of member states, it seems possible to arrange for continuity – after a period of transition – of the new Catalan state EU membership.	This option overlaps with the macroeconomic Mutual Agreement Scenario S01, with a transition period similar in terms of economic outcomes to the shock induced in an economy that defaults on its debt, but relatively short-lived (3 years)
2. Fast accession track	To the extent that fast accession would require the unanimous consensus of all members states, as it is required for the ordinary accession, this option is not feasible without the agreement of Spain or other member states that could impose their vetoes to re-admission of the new Catalan state. However, given other experiences, a pragmatic solution could be an option to overcome a political stalemate since Catalonia -and its citizens- is already part of the EU.	In case of mutual agreement with Spain, this option is in practice almost equivalent to the previous one, so it overlaps with the Mutual Agreement Scenario S01. If there is no agreement, the fast accession process will fail, and the Unilateral Exit Scenario S02 will therefore prevail.
3. Ordinary accession	As mentioned already for fast accession, the ordinary procedure requires unanimous agreement of all member states, so it is not feasible without the consensus of Spain.	In case of mutual agreement with Spain, this option may be roughly equivalent to the previous ones – the only change could be a longer accession process that however could be still contained within 3 years - so it overlaps with the Mutual Agreement Scenario S01. If there is no agreement, the accession process will fail, and the Unilateral Exit Scenario S02 will therefore prevail.
4. Bilateral EU-Catalonia trade agreement	This option is feasible also without the agreement of Spain or a minority of member states, to the extent that it covers only matters of exclusive competence of the European Union.	This option practically overlaps with the Unilateral Exit Scenario S02, which does not require the agreement of Spain.
5. Bilateral cooperation agreements	To the extent that bilateral cooperation arrangements are mixed agreements, requiring for substantial parts of them the unanimous agreements of all member states, they are subject to possible vetoes from Spain or some other member states. This means that currently are not feasible, as the agreement of at least Spain cannot be granted.	This option can only work if there is mutual agreement. However, if mutual agreement exists, is more probable that will be convened to support the EU membership options (permanence, fast accession or ordinary accession), rather than bilateral cooperation agreements. In any event, the short-lived transition period assumption of the Mutual Agreement Scenario S01 is valid only for those membership options, as bilateral cooperation arrangement might require a longer time to mature (e.g. Spain may oppose immediately to any form of EU membership, but agree later to establish a bilateral agreement when it perceives is in the common interest). So, this option eventually becomes equivalent to the Unilateral Exit Scenario S02.
6. Bilateral association agreements	The same as bilateral cooperation agreements above.	The same considerations made above for the bilateral cooperation agreements apply here.
7. EFTA and European Economic Area membership	Membership to EFTA – with the important benefit for the new Catalan state of belonging to the Schengen area – is easily feasible, as it will require the agreement of (mostly) Norway, Iceland, Liechtenstein and Switzerland. However, what matter most is to enter EFTA as a prerequisite for EEA membership. As the latter is granted only if all EU member states agree, it is not feasible without the agreement of Spain.	EFTA membership is possible without the agreement of Spain, so it is an option associated to Unilateral Exit Scenario S02. On the contrary, EEA membership is feasible only in case of unanimous agreement of all EU member states, including Spain. In practice, the same considerations illustrated above for the bilateral cooperation or association agreements apply, and we can assume a longer transition period, with Spain agreeing on inclusion of Catalonia in the EEA after a period of embargo. Again, the EEA membership option becomes equivalent to the Unilateral Exit Scenario S02.

4.2. A forward looking strategy: Scenarios for independent Catalonia relations with the EU under a reformed "European Political Union" (EPU)

All the options of membership or cooperation of an independent Catalan state with the European Union scrutinized so far in the previous section did not consider any substantial change in the structure and institutions of the European Union.

This "business as usual" assumption is obviously reasonable if we consider those until 2030 – the horizon considered in our study - as ordinary times. However, we are not living ordinary times today. In 10 to 15 years from now many events could change more radically the course of history, and contribute to make European political integration a concrete option, and perhaps even a necessity.

If the European Union will change, also the game between Spain and Catalonia may substantially change. Some sort of parallelism may be established here between the evolution of the Catalonia and Scotland's independence claims. In Scotland, after the negative outcome of the referendum on independence from UK of last September 2014, the Scottish National Party obtained a landslide majority in Scotland in the last UK elections of May 2015. The ConservativeParty led by David Cameron won the UK elections promising amongst other things to convene a referendum on UK membership to EU in 2017. In practice, this is opening radically new options and possibilities, both for the internal UK state of affairs[24] and for some sort of renegotiation of the membership of UK in the EU. The latter should not be only seen as a threat to EU stability, it could be a stimulus and an opportunity for both the UK and the EU to evolve towards a more federal structure, rebalancing the distribution of sovereignity and function all along the chain – at European, national and regional level (the latter including state level entities in old and "new" federal countries). Spain could be involved in this process as all the other 27 EU member states. Some functions now centralized in the Spanish national state can be moved up to the European Union, and a more rigorous application of the subsidiarity principle across all the member states may contribute to further empower the regional and local level[25] also in other unitary and centralist nations of Europe. The whole change may contribute to open new avenues for achieving independence – or at least a greater and more substantial autonomy - making worthwhile for the Catalans to consider a new and more gradual and smooth strategy, in the context of a reformed European Political Union (EPU) that, in this section, we present as a possible future reality.

However, before describing in detail a possibly radical step of further integration in Europe until the year 2030, let us explain briefly why we consider ours not ordinary times. Indeed, there are at least three factors or "tensions" that in our opinion will drive the future of Europe towards building a truly political union to answer to the mounting challenges:

- **Financial tensions** in the Eurozone, which calls for completing the European project accompanying the monetary and banking union with a fiscal and political union.
- **Democratic tension**, with the increasingly gap between the EU institutions and technocracies and the citizens – who do not feel anymore en-

24. Some commentators, as Timothy Garton Ash on La Repubblica, Saturday 9 May, are now looking to a federal United Kingdom as a possible solution to the independence pressures of Scotland, and involviong also Wales and Northern Ireland.

25. In the late eighties and early nineties national governments had transferred powers both to a supranational authority (EU) and to local and regional governments and this process (Sandwich hypothesis) thus was expected to shorten even more the powers of the State. However practicalities showed that the state's powers were not reduced in comparison with the regions. In fact time demonstrated that the capacity of the regions to play a more enhanced role at EU level fell very short from initial expectations.

gaged in the EU policies – and the widening divide between employed and unemployed, haves and have not, elderly and youth, and citizens living in the currently more stable economies of North Europe as opposed to worrisome conditions in Southern Europe. As for the latter, the North-South divide is indeed also contributing to create new distances between the citizens of Europe.

- **External tensions**, with the civil wars spreading in the Southern Mediterranean countries (Syria, Libya, but also Egypt, Tunisia and possibly other countries are at risk) and in the Eastern neighborhoods (Ukraine). These tensions to be adequately addressed will call for: i) more unity and coordination of the defense and security policies within the European Union borders, ii) more cooperation with the neighborhoods to sustain democracy and help to address societal and economic challenges ahead, and iii) a more profound dialogue and integration with the populations of immigrants to Europe, of first or second generation.

The convergence of these tensions may contribute to drive the future of the European policy towards more – not less – union, although it is clear that some tensions may also affect the scenario in the opposite direction. For instance, the democratic tensions may cause the breakdown of the European Union, or at least some fragmentation and the exit of some partners, if populist or non-conformist movements with the current EU will prevail in some countries.

The path to a European Policy Union is open since the very foundation of the EU, it is not to be reinvented anew. There is a long tradition of reflections on European political integration, beyond the economic integration of the member states in a Single Economic Market, in particular with a federalist orientation. In the past, the federalist perspective has been the subject of irritation, criticism and opposition. This primarily for two reasons: first, those who are opposed to it associate a federal structure with a state – e.g. the United States of America – which they do not accept as the desired result of integration; second, they consider a federal structure to represent centralization (a European "super-state") at the expense of sovereign nation states. However, an intense debate on the fundamentals of the present and future EU is ongoing. This, although it continues to show prejudice and confusion about what federalism and the federal principle really mean and how it can contribute to cement the European Political Union, helps to clarify structural principles that can provide again a guidance to re-launch a European constitutional process.

Federalism, as a structural principle for the territorial organization of the future European Political Union, is expected to fulfill two major functions:

- to bring about "unity in diversity", that is to say to form a larger whole composed of smaller entities with their special features (e.g. language, religion, culture, history, economic structure, etc.); the compound includes the component parts, forms something like a roof and coexists with them while each of them preserves its identity which makes it distinct from the others;
- to contribute to patterns and mechanisms of "checks and balances" in that different levels of government – for the exercise of political power – exist and the whole institutional pattern shall bring about a proper balance amongst the institutions located at different levels.

A scenario envisioning a transition to a truly European Political Union should restart from these functions, and check to what extent the key elements of a federal structural are already present in the European Union architecture, and what could and should be changed to complete the European political project.

Briefly, we remind the key elements of a federal structure:

- the existence of at least two levels (national or sub-national) for the exercise of the political power;
- the allocation of competences and financial resources (including equalization mechanisms) between them, resulting in a system of shared/divided competences and resources;
- a legal basis (treaty or constitution) for this arrangement;
- a system of government for each entity (national and subnational) with an elected parliamentary assembly and an executive accountable to the assembly;
- an institution to settle disputes (in most cases: a constitutional court or its functional equivalent);
- procedural rules on the participation of lower level entities in decision-making at higher levels

and the extent to which these are present in the current European Union institutional framework:

- in the EU, decisions (including legislative acts) with a direct effect upon citizens or enterprises are taken at national and community level. The system is characterized by the principle of shared and divided sovereignty, and there are cases in which the ultimate decision lies with the EU;
- the number of competences at the disposal of the EU has grown, since the functional scope of the Community has been extended considerably in connection with the treaty reforms. This has resulted in a situation characterized by a lack of safeguards for member state competences, since the principle of subsidiarity introduced in the Treaty of Maastricht has proved to be only of marginal effect for limiting the activities and legal acts of the EU;
- the EU has its own financial resources, although not the power to determine its revenues[26]. Some EU policies – especially structural and cohesion policy and common agricultural policy – lead to a de facto financial equalization, with "net payers" and "net receivers" countries. Another feature of the EU's financial system is the principle of co-financing, that is to say shared financial responsibility for particular joint projects
- the constituent parts of the EU, the member states, participate in a very elaborate and complex way in decision-making at EU level; and we find the coexistence of unanimous and qualified majority decisions;
- the legal basis of the EU is an international treaty, but the European Court of Justice in its ruling considers treaty provisions to be of "constitutional" format and quality. Citizens, enterprises and member states (their governments) have to comply with these provisions. European law prevails over national law;
- the European Parliament is the institution which represents the citizens (not the states which are represented by their governments in the Council) as participants in EU decision-making. The EP's internal and working structure is primarily determined by partly political (not na-

26. The EU does not impose taxes. This is done only at the level of each country, and the EU budget is funded almost entirely by "own resources", including direct contributions from each country, custom duties and a very small share of national VAT revenues. The countries of the EU decide together on the types and maximum amounts of these "own resources". However – although national governments are broadly free to design their tax laws according to their national priorities – they must respect certain fundamental principles, such as non-discrimination and respect for free movement in the internal market. The EU makes this up with cooperation procedures and a legal framework to ensure the fair and efficient taxation of cross-border activities in the EU.

tional) groups; and the EP's role in decision making, notwithstanding the still predominant role of the executive institutions (the Council and the European Commission) has been strengthened considerably.

Surely, the EU system can be subsumed already under the category of a federal system without resembling any one particular system of already existing federations, like for instance Germany, Belgium, Canada or USA. It does represent a special type of federal structure ("sui generis"), which has emerged and is developing further. The European Convention – blocked after the negative results of the referenda in Ireland and France in 2005 – was going in the direction of further clarifying and strengthening several federal features of the EU. It envisaged a legal personality for the Union to enter directly into international commitments that are binding for all member states. It recognized regional and local levels as integral component parts of the EU, strengthening the application of and compliance with the principle of subsidiarity. It limited the Union competences in that they need to be conferred explicitly (and they were divided in three categories: exclusive competences, shared competences and "areas of supporting, coordinating and complementary action"). It expanded the number of cases to be decided with a qualified majority, which would have contributed to further reduce the autonomy and veto power of single member states. It extended the co-decision procedure, with a greater role of the European Parliament in legislation, which again would have contributed to reduce the autonomy of individual member states represented by their chief ministers in the Council. Last but not the least, the European Convention was giving to the fundamental document of the European Union the label "Constitution" to indicate a new quality of the EU and the integration process, notwithstanding the fact that the basic document needed to be ratified as a treaty in each member state.[27]

All these new provisions would have contributed to the character of the future European Union as a federation in being, if the Convention had ratified, that was not the case. The failure of the ratification process has halted the European Political Union process, and after 2008 the financial crisis has shifted the attention mostly on solving the problems of the Eurozone.

However, it is increasingly clear that one way to return to stability and continue with a virtuous process of development of the European project is to restart the process from where it has been left, promoting a new European Political Union which will help to address the financial, democratic and external tensions and challenges mentioned above.

Looking forward to a radical shift – not "business as usual" – scenario, we envision a possible "more Europe" scenario. This is a caricature of the future where the European Political integration process – beyond the single market – restarts and contributes to consolidate the current union, while at the same time opening to some limited "internal enlargement" (with the constitution of an independent Catalonia state into a new federal Europe) and also the geographical extension of the Union, with the inclusion of the currently (official or potential) Western Balkans candidate countries (Macedonia, Montenegro, Kosovo, Serbia, Albania, Bosnia and Herzegovina). In this vision, a new Constitution of the EU granted the application of the principle of "unity in diversity", creating a larger whole composed of smaller entities with their special features (e.g. language, religion, culture, history, economic structure, etc.), and Catalonia eventu-

27. Moreover, this Constitution had to be completed including, as Part II, the Charter of Fundamental Rights of the Union adopted in connection with the Nice summit in late 2000 – meaning that all institutions, when exercising power, need to recognize the rights, freedoms and principles listed there as common values.

ally became a new member state of the Union. Admittedly, current trends in Europe does not presuppose that greater and closer integration of this sort will be achieved, but this should not refrain from considering possible radical changes and new regional cooperation strategies as those envisioned in the following.

The "More Europe" vision: The European Union evolves into a full European Political Union (EPU)

What in this vision makes the Union a new political entity on the global arena are a number of additional features, some of them formalized in the new EPU Constitution ratified by all member states.

Fiscal and political union

The main driver leading to a fiscal and political union has been the crisis of the Eurozone since 2009, which raised a more general question having to do with the overall architecture of the EU. How did Europe come to create a currency without a state? The usual answer to this question was that the creation of the euro was but one step in a lengthy process. Since the beginning, when it became a reality for some core European countries in January 2002, monetary union was supposed to lead naturally to political, fiscal, and budgetary union, to ever closer cooperation among the member states. To some extent this was true, but in the aftermath of the global financial crisis and with the outstanding issue of how to manage the question of the public debt in Europe, and especially in Southern Europe, the entire process proved not to be "natural", and indeed risked to derail. Europe created a currency without a state and a central bank (ECB) without a government for pragmatic reasons, after a long period of stability when many people believed that the only function of central banking was to control inflation. The crisis of 2008 shattered this static vision of central banking, as it became clear that in serious economic crisis central banks have a crucial role to play and that existing European institutions were wholly unsuited to the task at hand. From the introduction of the euro in 2002 to the onset of the crisis in 2007-2008, interest rates were more or less identical across Europe. No one anticipated the possibility of an exit from the euro, so everything seemed to work well. When the global financial crisis began, however, interest rates began to converge rapidly, and the impact on government budget was severe. Especially for the countries of Southern Europe, the options were truly impossible. Before joining the euro, they could have devalued their currency, which would at least have restored competitiveness and spurred economic activity. Speculation on national interest rates was in some way more destabilizing than the previous speculation on exchange currencies among European currencies. Logically, such a loss of monetary sovereignty should have been compensated by guaranteeing that countries could borrow if need be at low and predictable rates. At a given time, the only way to overcome these contradictions was for the countries of the Eurozone to pool their public debts. But the pooling of public debt triggered important institutional changes, in the direction of a greater political and fiscal union. To decide how quickly to pay down the pooled debt, or, in other words, to decide how much public debt the Eurozone should carry, one would have needed to empower a **European budgetary parliament** to decide on a **European budget**. The best way to do this proved to be drawing the

members of this parliament from the ranks of the national parliaments, so that European parliamentary sovereignty would rest on the legitimacy of democratically elected national assemblies. Like any other parliament, this body had to decide issues by majority vote after open public debate.[28] In any event, mutualization implied that there needed to be a vote on the total size of the debt. Each country maintained also its own debt, but its size had to be kept modest, like state and municipal debts in the United States. Finally, if a budgetary parliament had to decide what the Eurozone's debt ought to be, then there clearly needed to be a **European finance minister** responsible to that body and charged with proposing a Eurozone budget and annual deficit.

In addition to pooling debts and deficits, it was clear that other fiscal and budgetary tools that no country can use on its own – so that it would make sense to think about using them jointly – where available to feed the political union with more fiscal powers. Since 2015 new ideas and the mounting evidence of global income and wealth inequalities raised the attention and willingness of policy makers to adopt again more progressive systems of taxation, especially to partially redistribute the huge income and wealth concentrated in the highest deciles and percentile of the distribution, as growing inequalities had undesired collateral effects on social cohesion. In 2020, the European Political Union manages directly a range of fiscal tools. The most suitable taxes eventually introduced at the European level have been:

- the **harmonization of national VAT rates**, to avoid distortion of competition between the member states;
- a **European Carbon Tax**, to stimulate the reduction of emissions, the private investments in clean technologies, and to finance public infrastructure investments to adapt to climate change across North and South Europe;
- a **European Tax on Corporate Profits**. Tax competition among European states has been fierce since the early 1990s, in particular with several small countries – with Ireland leading the way, followed by several Eastern Europe countries – making low corporate taxes a key element of their economic development strategies. This type of competition is sub-optimal from the point of view of the competitiveness of the entire European industry. It was increasingly clear that the right approach would have required corporations to make a single declaration of their profits at the European level and then tax that profit in a way that is less subject to manipulation than is in the current system of taxing the profits of each subsidiary individually.[29] With the European tax on corporate profits it made more sense to give up the idea that profits can be pinned down to a particular state or territory; instead, the revenues of the corporate taxes could start to be eventually apportioned on the basis of sales or wages paid within each country.

As a result, all these European fiscal tools give to the EPU government a substantial autonomy. The contributions from the member states' national budgets – now the lion share of the European Commission revenues - become a minor component of the European budget. The latter in 2030 is increased to a range between 5 and 10 percent of the European GDP, much more than the about 2 percent typical of the years until 2015. Thanks to this budget level, the EPU can perform a number of new functions and common policies, on exclusive or shared basis with the member states.

28. As pointed out by the first who proposed such arrangement, Thomas Piketty, the decisions of such a body will never be ideal, but at least we would know what had been decided and why, which is important. (cfr **Thomas Piketty**, *Capital in the Twenty-First Century*, The Belknap Press of Harvard University Press, London, 2014, page 528).

29. The problem with the current system is that multinational corporations often end up paying very small amounts because they can assign all or part of their profits to a subsidiary located in a place were taxes are lower; such a practice is legal. .

A new Cohesion Policy

The budget devoted to regional and cohesion policy in 2030 is doubled or even tripled. A new cohesion policy agenda includes both solidarity and **territorial development and cohesion** tasks. The former requires transfer from the wealthier to the poorer regions of Europe funds to guarantee solidarity across Europe, on matters related to financial stability, energy interdependence, migration and EU border management, adaptation to climate change, combating urban and rural poverty and unemployment, including commitments of responsibility by those receiving financial aid. In this respect, the federalist principle – already working in the core of Europe, Germany, after the Second World War – is extended to the entire Europe: the member states have a taxation agency that collects all the major taxes, including the European ones. While the European taxes are transferred to Brussels to finance the European institutions and other common policies, for the purpose of financing solidarity funds, member states use a share of their national taxes and with the money in their own pocket, they negotiate equalizing transfers between the different regions and thus limit transfer to Brussels. This mechanism limits de facto the transfers to a small percentage of GDP (no more than 3-4%) in the net contributing states. In addition, a net contributing state cannot, after distribution, be below the per capita income of a net receiving state.

The territorial development and cohesion tasks aim to the overall harmonious development of Europe, reducing disparities between regions. This is achieved through considering both the efficiency and equity dimensions of development, and establishing two interdependent although different policy objectives: all regions must be given the opportunity to achieve their full socio-economic potential, using their specific territorial capital (territorial efficiency*),* and all citizens must enjoy an equivalent quality of life. In particular, the citizens' fundamental rights and the access to basic health, education and other services of general interests are guaranteed for all.

New common foreign, defence and security policies

In 2030 Europe speaks with one voice on the global arena, and protects the territorial borders of the EPU and cooperates in peace-keeping operations - whenever these are claimed by the global governance institutions (United Nations or new institutions at the time) – with one army. The EPU army is the composition of member states armies. Central services and coordination and strategic functions of the army are maintained through the European budget, while the member states maintain the local troops and weapons in their own territory. By the same token, internal security is ensured through tightly coordinated national security services. This higher level of coordination was necessary in particular since 2015, to cope with the mounting challenge of international terrorism and other global security threats.

Enhanced community energy and climate, agriculture and fisheries, migration, employment and social security, external trade policies

These sectorial policies continue to be governed mostly from the nation states, but coordination and common strategies at Community level

are strongly enhanced. For instance, there is really one strategy leading the whole Europe energy interdependence and transition to a low-carbon economy, not single and sometime diverging energy transition policies in the member states as it was in the past. In addition, ad hoc partnerships have been developed to bridge policies and share strategic co-development goals with the countries of the South Mediterranean and the Middle East, in particular on energy matters, agriculture and fisheries, migration, education and human capital development issues. A Community social security system was not feasible and even not desirable in the European context.[30] –However, a stronger Community policy in the employment and social security sector has ensured a better harmonization of the national pensions and security systems, and citizens benefit from comparable treatments across the entire continent. Moreover, trade policies are mostly national, as each member state has different competitive advantages to exploit. However, the much stronger stability of the Eurozone – eventually achieved through the political and fiscal union of its members – and the harmonization of VAT and corporate tax rates has transformed the competition landscape within the EUP. As a result, in 2030 the massive and growing imbalances in the balances of payments of the single countries **are a memory of the past** (sounds a bit odd) (i.e. the times of crisis we are living today). The external trade policy is coordinated enough to ensure that gains for European industries are mostly pursued on the global market, in particular increasing competitiveness at the technological frontier with the help of Innovation Union policies.

To conclude, what would be the most likely and important implications of this European Political Union scenario for the future of Catalonia, and in particular for the relation with Spain?

A complete answer to this question is provided in Part III of this report. Part III summarizes as well the policy implications and recommendations stemming from the results of the macroeconomic scenarios presented in Part I, and of the pathways for an independent Catalonia integration within or cooperation with the EU in its present institutional form, discussed in the first section of Part II.

We can anticipate however the most evident consequences of the European Political Union scenario for the relations between Catalonia and Spain. It is evident, indeed, that constitutional changes of the amplitude envisaged for implementing a more federal European Union will affect the constitutions of the member states as well. For all the member states the transfer of some powers to the European Union – in particular those related to foreign policy and defense matters – need to be reflected in their national constitutions. The same for some provisions related to the fiscal and political Union, including in particular the national contribution to the European budgetary parliament and the transfer of financial responsibility to the EU level. These changes will make the prospects for Catalonia independence far less dramatic, because:

- macro-finance issues and related risks – key factors increasing the transition costs in the macroeconomic scenarios analyzed in Part I - will be no more affected by the independence process, in presence of a stabilized common currency (euro), an effective banking union and a **mutualization of the public debt at European level**;

30. Following the example of the United States Federal system – this would have required the transfer of more fiscal power to the European government in order to achieve a budget level of about 25-30 percent of the European GDP instead of 5-10 percent.

- the purpose of the army will be no more to protect the territorial integrity of Spain (as per Article 8 of the current Spanish Constitution), but that of the whole European territory, thanks to the fusion with the national armies of the other EPU member states.
- A consistent application of principle of federalisms across Europe should influence also centralistic states as Spain. This either legitimating a **greater autonomy of Catalonia within Spain**, or its independence as a new European state, based on the evident special features of the region, i.e. its language, culture, history, economic structure. Moreover, the self-determination rights of the Catalans could only be enforced by being citizens as well of the European Political Union.
- The new EUP cohesion policy agenda will include more explicitly solidarity tasks and rules for transfer of funds from wealthier (as Catalonia) to poorer regions (not only in Spain, but in the entire Europe). The mechanism will cap the fiscal deficit of the wealthier regions to avoid that their per capita GDP becomes as a result lower than per capita incomes in the poorer regions. In practice, the current fiscal deficit of Catalonia with Spain (about 6-8 percent, depending on how it is measured) will give place in the future to a fiscal deficit matured in the context of the European cohesion policy. The latter may be in the order of 3 percent of the GDP, no more (based on the likely assumption that an independent Catalonia will be one of the wealthiest countries of Europe). It is important to note here that the fiscal deficit of Catalonia with the EU in the period 2007-2013 was on average 0,72% of the regional GDP (about 1.4billion euro per year). So, the strengthening and intensification of cohesion and solidarity funds in the future European Political Union will increase the contribution of Catalonia more than 3 times.

5. PART 3: CONCLUSIONS AND POLICY IMPLICATIONS

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In view of the macro economic assessment of the scenarios of Catolonia as an independent state under mutual agreement or unilateral secession assumptions in horizon 2030, the study points to the macro-economic insustainablity of the status-quo scenario from growth and employment perspectives due to the high and sustained deficit of Catalonia.

In the short run uncertainty, high interest rates and a volatile investment environment triggered by the decision to secede is found to slow the Catalan GDP growth rate; the effect is more pronounced if the decision to secede is unilateral. However the structure of the Catalan economy and the pursuit of fiscal policy towards a balanced public budget can deliver higher than the reference GDP and employment growth rates, once the transition period to sovereignty is over.

The overall net effect from secession on the Catalan economy is the result of a multitude of short and long run adjustments with frequently opposing effects. The short-term effects stem from the positive changes in fiscal imbalances, improved domestic production and negative changes owing to uncertainty and risk factors that are difficult to quantifiy with firmness. The long term effects which rely largely on the capacity of the economy to adapt via increasing infrastructure capacity, which increases in turn economy-wide productivity and competiveness and effective public spending, while reducing uncertainty due to the strong economic fundamentals of the Catalan economy.

As expected Catalonia benefits more under mutual agreement on secession as the lower uncertainties and risks associated with secession in this case allow for a faster recovery of the economy from the shock of independence from Spain.

These conclusions favor a scenario for secession under mutual agreement between Catolonia and Spain and an orderly planning towards resolution as opposing to a scenario of unilateral secession. It thus reduces any uncertainty and risks which effects are detrimental to all parties.

The scenarios for cooperation of the new Catalan state with the European Union in its present institutional setting (statu-quo), including forms of permanence or re-accession to the EU as well as possibilities for opting out and establishing new agreements with the EU from outside have been extensively discussed. Undoubtedly, options and possible legal procedures underpinning the mutual agreement scenario between both entities are equally prefered as it leads to smooth transition towards a new equilibrium.

A more long-term prospective normative scenario of European Union reform would change the game for both Spain and Catalonia negotiations. Such a scenario delineates schematically the evolution towards a desirable future, with the transformation of the Eurozone into a truly political and fiscal union, the "European Political Union (EPU)". This is assumed to unfold under the pressure of disruptive economic and geopolitical dynamics, of which we see already today several signals. In such new context, Catalonia could achieve the status of an independent Member State of the EPU either under the mutual agreement scenario or the unilateral scenario. However such a prospective analysis might be dismissed if the negotiations between Catalonia and Spain would resume in the short run.

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7. APPENDIX 1: HISTORICAL OVERVIEW ABOUT CATALANISM AND MODERN SELF-GOVERNMENT

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"The Prince should not be above the law but rather the law above the Prince". Francesc Solanes on Catalan laws and Constitutions (1700)

Catalan nationalism or catalanism[31] started off as a political movement in an attempt to build a federal state in Spain in the context of Spain's First Republic which took place during the short and highly convulsive period of 1873-74. Valentí Almirall and other Catalan intellectuals participated in this process to establish a new political ideology in the mid-19th century to modernise and regenerate Spain[32] as a country and also to restore self-government, as the most effective tool to obtain recognition for the Catalan language, culture and identity and also to promote economic interests. This was done without attempting to disintegrate Spain as a united country. In fact Catalanism searched ways to reform Spain and become a more modern and progressive country in line with those of northern Europe. All these demands and its philosophy were summarized in the so-called *Bases de Manresa* of 1892. As a consequence of such perseverance and public mobilisation a low sort of autonomy was finally achieved in 1914 with the regrouping of the four Catalan provincial bodies in one single entity, called *La Mancomunitat* –the Commonwealth, led by the powerful and distinguished figure of Enric Prat de la Riba. The Mancomunitat created and implemented a number of cultural and scientific institutions in order to confer greater prestige to Catalan language and culture. Amongst them the Institut d'Estudis Catalans (Institute of Catalan Studies), the Biblioteca de Catalunya (Library of Catalonia), the Escola Industrial (Industrial School), the Escola Superior de Belles Arts (Higher College of Fine Arts), l'Escola Superior d'Estudis Comercials (the College of Higher Commercial Studies) or the Escola del Treball (College of Industry). Under the leadership of Prat de la Riba it was also created, the Escola de l'Administració Local (School of Local Administration), and required Catalan civil servants to have attended this institution. Many of these institutions, being inspired in the Anglo-Saxon world, were unique and had no counterpart in the rest of Spain.

31. Catalan nationalism or catalanism, are two names with a very similar or almost identical meaning, is a sort of (European) nationalism which asserts that Catalans are a distinctive European nation with their own political rights and promotes the cultural and linguistic unity of all Catalans. Some forms of nationalism are based in religion, ethnicity, race, or solely in economic matters. This is not the case of Catalonia, the core of this movement has to do, above all, with their own language and culture and foreigners residing in Catalonia are encouraged to integrate. Traditionally for the Catalans their sense of nationhood did not imply breaking-up with Spain as nationalism, as a political tool and in their objectives, in this part of the world has not been in origin a pro-independence type of national movement unlike other forms of nationalism that have been established in other parts of Europe or elsewhere. Now this notion is clearly being called into doubt by many in Catalonia since Spain's different Governments and institutions (judiciary, army, economic powers etc) are perceived by the people that have unilaterally breached the 1978 Constitutional consensual agreement.

32. In this period a Catalan minister of finance Mr. Laureano Figuerola introduced a Catalan currency "pesseta" –small piece in Catalan language- as the single currency for all Spain.

Another important landmark of the *Mancomunitat* was the promotion of the work of Dr. Pompeu Fabra, who was pioneer and responsible for the current Catalan Grammar and linguistic standard. Despite its remarkable success the *Mancomunitat* was first toned down and then outlawed during General Miguel Primo de Rivera's military dictatorship in 1925. The current autonomous institutions in Catalonia owed a great deal to the works, philosophy and sense of togetherness of *Mancomunitat*.

Origins of Catalonia's political system and its institutions

Catalonia began to develop its own legal and political order after it liberated itself in 987 from the authority of the Carolingian Empire. To the Catalans' view the Carolingians or Frankish, which the Catalan counties were under its direct sovereignty, were not properly defending the country –the so-called Hispanic March- against the Moorish ratzias that were posing a big threat to the safety of the population and therefore count Borrell II opted for not renewing the sovereignty pact with the King of France and proclaim independence for his counties. Later on during the XI century *The Pau i Treva* Constitutions (Peace and Truce) and the *Usatges* (Customs) established the foundations for the civil charter of Catalonia, which was enhanced and updated in the centuries to come. The Parliament of 1283 (called "the General Court for the Catalans"), one of the oldest and most well suited parliaments of medieval Europe institutionalized the role of the assembly of estates and its legislative powers shared with the king. It also consolidated the monarchy, as the relationship with the king was based on pacts, a political doctrine establishing the sovereign's respect for the laws and the country's respect for the sovereign. In 1359 the *Diputació del General* (a sort of legislative chamber) was created initially for the purpose of tax collection but it almost immediately was credited as the country's government and the political body that implemented the law. Also in the governance of the city of Barcelona a council of One Hundred –Consell de Cent- representing the distinctive social groups it was established as the instrument to better channel the different and competing interests in that society. This period also saw the expansion and consolidation of a Catalan maritime empire that extended across the Mediterranean Sea following the conquest by the Catalans of Valencia, the Balearic Islands, Sardinia, the Kingdom of Naples and Sicily and the Duchies of Athens and Neopatria. As a result of it, a large increase of maritime trade took place in the Catalan ports, particularly in the Crown's preeminent city, Barcelona.

It is also during the Middle-Ages when the Catalan nation developed a fine literature in a variety of specialties that has lasted to this day. All these (institutional, cultural and national) features conferred to Catalonia the status of a nation already in the period which stems from the 13th and 14th centuries[33].

In 1422 the first compilation of Catalan laws was made by combining the *Usatges* of Barcelona, the Constitutions of Catalonia and the prevailing *capítols de cort* (laws proposed by Parliament). In 1589 this compilation became the official *Constitucions i altres drets de Catalunya* (Constitutions and other rights of Catalonia). This constitutional effort, understood as a development, not a national code but a national heritage aimed to place limits on the power of the king and organize the *public commonwealth*. The Customs of the Sea –El Consulat de Mar- was another relevant institution. This set of maritime

33. See Pierre Vilar, "Història de Catalunya", Editorial Base. 1989

customs and ordinances in Catalan language was compiled over the 13th century with its final writing in 1350. It was finally published in Barcelona at the end of the XV century. This sort of judicial body expanded its jurisdiction to administer maritime and commercial law throughout the Mediterranean geography and beyond and was not abolished until the second half of the nineteen century when it was replaced by a new code of Spanish maritime law under French inspiration.

In 1640 the Catalans rebelled in the so-called Guerra dels Segadors –the Reapers War-, encouraged by some French intervention. There were two main reasons for the rebellion: 1) the Catalans were dissatisfied of Castilian continuous demands for troops and financial resources to fight in the war with the French, and secondly the Catalans feared their legal and political system being "reduced to the style and laws of Castile" as stated by Phillip's the IV[34] first minister the not-much-beloved by the Catalans Count-Duke of Olivares. In that war which lasted for more than twelve years, Louis XIII was even made for a short while King of Catalonia, the Catalans lost their northern-most countries placed beyond the Pyrenees to France as stipulated by the Treaty of the Pyrenees of 1659. Nevertheless the Catalan legal and political system remained intact.

This system of self-government reached its maximum development when the Parliament of 1701-1702 and 1705-1706 elaborated laws granting the greatest possible limits on the power of the king and his government in order to maintain observance with the law. Just before it was abolished by the new Bourbon king Philip V [35] at the end of the Spanish War of Succession in 1714, the Constitutions proved to be an effective tool for adapting to the demands of society and greatly reconciling the often conflicting elements of order and liberty. In addition to respecting the privileges of the nobility in this *ancien régime*, it provided social benefits for most people in the areas of taxation, war, justice, the economy and individual rights. In turn, the institutions had achieved considerable political capacity in the context of European parliamentarianism. It was a system based on political representation of the estates that allowed a high degree of representation of common people in municipal government. During the War of Succession, a conflict that involved major European powers, a choice had to be made between a system of solid Catalan government with capacity of renovation, based on contractualism and parliamentarism, confronted with a centralised system of Bourbon authority, genuinely absolutist and unitary.

With the severe and incontestable defeat of the War of Succession in 1714 Catalonia and the rest of the Crown of Aragon[36] lost all the laws and rights that characterised those countries. Centralism was duly and ruthlessly implemented and political and identity differences were accordingly prosecuted.

From a reformist type of nationalism to the move towards Independence

Catalonia is one of Spain's state historic nations. It has its own language with around 10 million speakers, part of the Romanesque family along with Italian, Spanish, Portuguese, French, Occitan, Romanian etc. Catalan is understood by the vast majority of the people and spoken by most people, and is used in the education system, in the public administration and in the private domain. In this respect it must be stated that all Catalans

34. Philip III in Catalonia's regnal number and tradition
35. Philip IV in Catalonia's regnal number and tradition
36. Also called Confederation Catalan and Aragonese for its division of powers and laws.

–except for the French part of Catalonia- also speak Spanish, having some Catalans Spanish language as their own mother tongue. Historically, Catalonia was part of a larger entity called the Kingdom of Aragon, which was united with Castile in the late fifteenth century. However Catalonia kept its own governing institutions (the Generalitat) and its legal system as it also did the rest of the territories part of the Kingdom of Aragon. This name, the Kingdom of Aragon, was misleading as it was Catalonia with its maritime and trading power and military force the one leading this confederation of separate entities (Catalonia, Aragon, Valencia, Balearic Islands etc) but with a common King, a common faith and a common foreign policy as the only equal elements with Castile.

The first serious attempts to curtail the Catalan self-government can be encountered during the seventeen century when "valido" count-duke of Olivares –prime minister of Habsburg Phillip IV- attempted to imitate and expand the rules of Castile to the entire Crown of Aragon and thus reducing the existing principles of confederation, in favour of centralism. This, together with the existence of a Castilian military contingent occupying Catalonia facing the French army and draining the resources of the people, provoked very serious unrest in Catalonia and led to the proclamation of independence by Pau Claris and the subsequent alliance with France and with the French King.

Only in 1714, after the Catalans sided with the losing coalition – UK, The Netherlands, Austria etc- in the War of Spanish Succession, were these civic and legal rights abolished. The Catalans supported the Austrian pretender – Charles III- and embraced the Anglo-Dutch mercantile and productivity model combined with the relatively decentralized and tolerant Austrian attitude towards the nationalities, as opposed to the politically centralized and economically Colbertian–mercantilist and therefore interventionist- French model. The outcome was, as we know, the suppression of the Catalan constitutions and liberties. It took more than 150 years for the Catalans to envisage a political program for the cause of autonomy and 200 years for achieving a small degree of self-governance with the already mentioned *Mancomunitat*.

Emergence of Catalan nationalism as a political tool

Catalan nationalist and federalist movements arose in the nineteenth century, and when the Second Republic was declared in 1931, Catalonia became an autonomous region within Spain. First attempts to proclaim independence led to a more restrained view in the face of political autonomy. Following the fall of the Second Republic after the Spanish Civil War of 1936–39, the dictatorship of General Francisco Franco annulled Catalonia's autonomy and prohibited any public usage, official promotion or recognition of the Catalan language amongst many other things regarding Catalan culture and identity.

The broad movement known as Catalanism, like other European national movements, is a product of the second half of the nineteenth century, the product of a cultural revival – known as *la Renaixença*- and the industrial take-off –Industrial Revolution- that made Catalonia the most dynamic territory in Spain and in the Iberian Peninsula as a whole. Historically,

Catalanism has sought the transformation of Spain into a pluri-national, modern state with less influence by Church and by the backward noble oligarchy, with Catalonia playing a full part in Spanish politics, although from the early twentieth century there has also been a movement in favour of an independent state of Catalonia. Early Catalanists called themselves regionalists but gradually the term nation gained ground and acceptance, coming into conflict with Spanish nationalists, for whom the only possible nation was Spain. Catalan nationalism is the stronger version of Catalanism, prioritizing Catalonia over Spain but not making a straight move towards separation. The early twentieth century and the 1960s and 1970s saw a massive movement into Catalonia of migrants from other parts of Spain and the Catalanist movement has, ever since, sought to incorporate them into the community, notably by encouraging them to learn the Catalan language and adapt to a common set of values.

Under the Second Republic (1931-1939), the self-governance body of *Generalitat* was restored but it was again abolished after Spanish Civil War resulted in the victory of the far right nationalist side under General Francisco Franco, who lasted for nearly forty years of dictatorship. Needless to say, the Franco regime suppressed the Catalan language and other symbols of Catalan national identity like the autonomous status in the name of a single Spanish nation. During the years of the Franco regime, propelling a radically anti-Catalan, anti-Europeanist and anti-democratic climate, Catalonia struggled to lead Spain in its move for the European model, - namely, democracy, recognition of human rights, economic growth, social capitalism and the welfare state - and spearheaded the struggle for the recognition of a more pluralist vision of Spain and the right for autonomy. Since the emergence of the so-called *transition to democracy* –roughly from Franco's death to the approval of the Constitution in late 1978- to the present day, Catalonian mainstream parties have shown full and unrepentant support to Europeanist initiatives of the various Spanish governments.

Restoration of self-government was among the major and historical demands of Catalan democratic forces in the wake of the death of Franco in November 1975. The Generalitat, prior to the approval of the new Constitution, was re-established, along with self-governing institutions in the Basque Country –the two territories that had enjoyed autonomous institutions during the Second Republic and the Civil War-. The 1978 Constitution also allowed other regions to gain autonomy, in order to water down the whole process, and soon the whole of Spain was divided into seventeen autonomous communities plus two autonomous cities –Ceuta and Melilla, Spanish enclaves within Morocco–. Since then, the big questions have been whether all seventeen communities should be treated the same or whether special recognition should be given only to the three so-called historic nationalities –including also Galicia-.

However, the Spanish constitution stipulates that there is only one Spanish nation but then ambiguously refers to 'nationalities and regions'. This is written without specifying which territories qualify as such. There is hence an ambiguity, which partially explains different interpretations and conflicting attitudes with the legal text.

For more than thirty years, Catalans accepted their statute of autonomy, the instrument to regulate relations with the state and the functioning of

Catalonia's institutions of self-government, as a reasonable compromise between historical Catalan autonomous demands and Spanish centralism/unionism, while gradually enhancing self-government in socio-political and economic/fiscal areas. Opinion polls showed, for many years, between 25-30 per cent in favour of independence, very few wanting to return to the old centralist system, and a larger support for a federal model for Spain, never properly specified but implying a large degree of autonomy, where Catalonia would have a distinctive –bilateral- relationship with the Spanish government. In the last five years –although the trend was already noticeable before the turn of the century-, however, there has been a dramatic rise in support for independence, which now gains a majority in most opinion polls. A series of unofficial referenda in towns and cities [37], following the great unrest caused by the verdict on the Estatut by the Spain's Constitutional Court, have shown sound majorities for independence – although in the large cities turnout has been low as opponents of independence abstain. A big number of groups, think tanks and associations have sprung up to support or to study the idea of independence and as a result a series of demonstrations in July 2010 , September 2011/12/13/14 gathered each one more than a million people on to the streets of Barcelona and other cities and towns in Catalonia. A massive human chain, resembling the one held in the Baltic countries prior to independence from the Soviet Union, was organised in 2013 linking Catalonia from North to South with the participation of 1.6 million people. Finally 9 November 2014 an unofficial consultation, held by the Catalan government though, mobilised almost 2.4 million people with almost 2 million voting for independence. The citizen participation process, as it was finally, branded on the political future of Catalonia was a non-binding vote on the political future of Catalonia that was held by the Government of Catalonia on 9 November 2014. While also known as the Catalan independence referendum, the vote was rebranded as a "participation process" by the Government of Catalonia, after a "non-referendum popular consultation" on the same topic and for the same date was suspended by the Constitutional Court of Spain. The ballot consisted of two questions: "Do you want Catalonia to become a State?" and "Do you want this State to be independent?". The second question could only be answered by those who had answered Yes to the first one. The Catalan government indicated that 2,344,828 votes were cast overall, but did not provide a turnout percentage figure. Turnout estimates published by media outlets range between 37.0% and 41.6% and 80.8% of the cast votes supported the Yes-Yes option, 10.1% the Yes-No, 4.5% the No option.

In September 27th 2015 elections are scheduled and the two main nationalist parties will run their own lists with the inclusion of independents in the lists. Also despite early criticism a left-from-the-centre ERC agreed to support the government's 2015 budget. 2015 is expected to be a confrontational one with tremendous electoral and political implications. Once this cycle is over perhaps a new momentum will start with a better opportunity for understanding and compromise.

Should a referendum be given a date with a question on independence it remains to be seen whether Spain proceeds to suspend Catalan self-government, as some voices have pointed out, or accepts, in a brand-new exercise of pragmatism, to perform the referendum and accept the final outcome.

37. Between the years 2009 to 2011.

8. APPENDIX A

GEM-E3-CAT MODEL DESCRIPTION

8 APPENDIX A: GEM-E3-CAT MODEL DESCRIPTION

The GEM-E3-CAT model is a multi-regional, multi-sectoral, recursive dynamic computable general equilibrium (CGE) model. The blueprint to develop the GEM-E3-CAT was the GEM-E3 model[38] which has been used by several Directorate Generals of the European Commission (economic affairs, competition, environment, taxation, research) and by national authorities. GEM-E3-CAT provides details on the macro-economy it is an empirical, large scale model, written entirely in structural form. GEM-E3-CAT is handled, operated and maintained by E3-Modelling.

The GEM-E3-CAT model simultaneously represents 11 countries/regions (Table 38) and 35 economic activities (Table 39) linked through endogenous bilateral trade flows.

Table 38. Regions of the GEM-E3-CAT model

No	Abbreviation	Country/Region
1	ESP	Spain
2	CAT	Catalonia
		Rest of European Union
3	DEU	Germany
4	FRA	France
5	ITA	Italy
6	PRT	Portugal
7	REU	Rest of EU28
		Rest of the world
8	CHN	China
9	FSU	Russia
10	EME	Emerging economies
11	ROW	Rest of the World

The model features perfect competition market regimes, discrete representation of power producing technologies, semi-endogenous learning by doing effects, equilibrium unemployment, option to introduce energy efficiency standards and it formulates emission permits for GHG and atmospheric pollutants.

38. For a detailed model description see Capros et al (2013)

Its scope is general in two terms: it includes all simultaneously interrelated markets and represents the system at the appropriate level with respect to geography, the sub-system (energy, environment, economy) and the dynamic mechanisms of agent's behaviour.

It formulates separately the supply or demand behaviour of the economic agents which are considered to optimize individually their objective while market derived prices guarantee global equilibrium, allowing the consistent evaluation of distributional effects of policies.

The model considers explicitly the market clearing mechanism and the related price formation in the energy, environment and economy markets: prices are computed by the model as a result of supply and demand interactions in the markets and different market clearing mechanisms, in addition to perfect competition, are allowed.

Table 39. Sectoral disaggregation of the GEM-E3-CAT model

No.	Activity	No.	Activity
1	Agriculture		**Power generation sectors**
2	Coal	26	Coal fired
3	Crude Oil	27	Oil fired
4	Oil	28	Gas fired
5	Gas extraction	29	Nuclear
6	Gas	30	Biomass
7	Electricity Supply	31	Hydro electric
8	Food products and beverages; Tobacco	32	Wind
9	Textiles	33	PV
10	Pulp, Paper and Non-metallic minerals	34	CCS coal
11	Basic metals	35	CCS Gas
12	Chemicals		
13	Fabricated metal products, except machinery and equipment		
14	Machinery and equipment goods		
15	Electric goods		
16	Transport equipment goods		
17	Other equipment goods		
18	Construction services		
19	Trade services		
20	Transport services		
21	Financial intermediation services		
22	Other business services		
23	Rest of Market services		
24	Recreational services		
25	Non market services		

The model formulates the production technologies in an endogenous manner allowing for price-driven derivation of all intermediate consumption and the services from capital and labour. In the electricity sector a bottom up approach is adopted for the representation of the different power producing technologies. For the demand-side the model formulates consumer behaviour and distinguishes between durable (equipment) and consumable goods and services.

The model is dynamic, recursive over time, driven by accumulation of capital and equipment. Technology progress is explicitly represented in the production function, either exogenous or endogenous, depending on R&D expenditure by private and public sector and taking into account spillovers effects. Moreover it is based on the myopic expectations of the participant agents.

The design of GEM-E3-CAT model has been developed following four main guidelines:

- Model design around a basic general equilibrium core in a modular way so that different modelling options, market regimes and closure rules are supported by the same model specification
- Fully flexible (endogenous) coefficients in production and in consumer's demand
- Calibration to a base year data set, incorporating detailed Social Accounting Matrices as statistically observed
- Dynamic mechanisms, through the accumulation of capital stock

The GEM-E3-CAT model starts from the same basic structure as the standard World Bank models[39]. Following the tradition of these models, GEM-E3-CAT is built on the basis of a Social Accounting Matrix (SAM). Technical coefficients in production and demand are flexible in the sense that producers can alternate the mix of production not only regarding the primary production factors but also the intermediate goods. Production is modeled through KLEM (capital, labour, energy and materials) production functions involving many factors (all intermediate products and three primary factors –capital, natural resources and labour). At the same time consumers can also endogenously decide the structure of their demand for goods and services. Their consumption mix is decided through a flexible expenditure system involving durable and non-durable goods. The specification of production and consumption follows the generalized Leontief type of models[40] as initiated in the work of Jorgenson (1984).

The GEM-E3-CAT model is built in a modular way around its central CGE core. It supports defining several alternative regimes and closure rules without having to re-specify or re-calibrate the model. The most important of these options are:

- Capital mobility across sectors and/or countries
- Flexible or fixed current account (with respect to the foreign sector)
- Flexible or fixed labour supply
- Market for pollution permits national/international, environmental constraints
- Fixed or flexible public deficit
- Perfect competition or Nash-Cournot[41] competition assumptions for market competition regimes

The model is not limited to comparative static evaluation of policies. The model is dynamic in the sense that projections change over time. Its properties are mainly manifested through stock/flow relationships, technical progress, capital accumulation and agents' (myopic) expectations.

The model is calibrated to a base year data set that comprises a full SAM for each country/region represented in the model. The construction of the SAM is the starting point of the model building work. The SAMs of the world ver-

39. The World Bank type of models constitutes the major bulk of equilibrium modelling experiences. This type of models was usually used for comparative statics exercises. The World Bank and associated Universities and scientists have animated a large number of such modelling projects, usually applied to developing countries. Main authors in this group are J. De Melo, S. Robinson, R. Eckaus, S. Devarajan, R. Decaluwe, R. Taylor, S. Lusy and others. These models however do not use full scale production functions but rather work on value added and their components to which they directly relate final demand

40. The generalised Leontief type of model was first formulated empirically in the work of D. W. Jorgenson who introduced flexibility in the Leontief framework, using production functions such as the translog. The work of D. W. Jorgenson inspired many modelling efforts, in which particular emphasis has been put to energy. For example, such models have been developed in France, by P. Capros, N. Ladoux, in OECD (GREEN and WALRAS), in Sweden by L. Bergman and in Germany by K. Conrad.

41. This option is available only for the EU version of the GEM-E3-CAT model

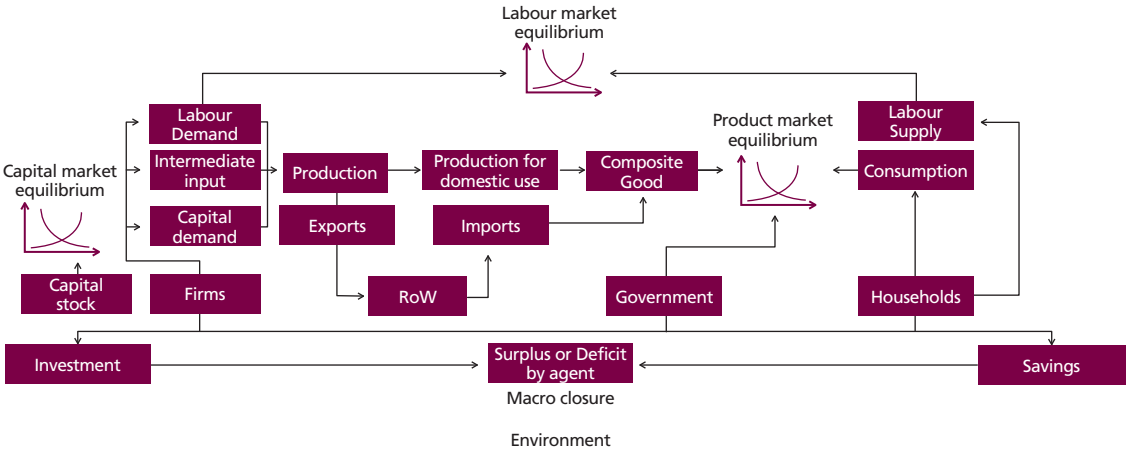
sion of the GEM-E3-CAT model are based on the GTAP database, whereas for the European version, the symmetric input-output tables and national accounts from EUROSTAT are used. The SAM of GEM-E3-CAT represents flows between production sectors, production factors and economic agents. The production sectors produce an equal number of distinct goods (or services), as in an Input-Output table. The SAM distinguishes between intermediate and primary production factors. The economic agents, namely households, firms, government and the foreign sector, are owners of the primary production factors, so they receive income from labour and capital rewarding. All inter-institutional transactions amongst the different agents as recorded in the national accounts are captured by the SAM. The agents use part of their income for consumption and investment, and form final domestic demand. The foreign sector also makes transactions with each other sector. These transactions represent imports (as a row) and exports (as a column) of goods and services. The difference between income and spending (in consumption and investment) by an economic agent determines his surplus or deficit.

Bilateral trade flows are also calibrated for each sector represented in the model, taking into account trade margins and transport costs. Consumption and investment is built around transition matrices linking consumption by purpose to demand for goods and investment by origin to investment by destination. The initial starting point of the model therefore, includes a very detailed treatment of taxation and trade.

Total demand (final and intermediate) in each country is optimally allocated between domestic and imported goods, under the hypothesis that these are considered as imperfect substitutes (the "Armington" assumption[42]). Figure 5 illustrates the overall structure of the GEM-E3-CAT model.

42. See Armington (1969).

Figure 5. GEM-E3-CAT economic circuit



Source: Capros et al (2013)

Institutional regimes, that affect agent behaviour and market clearing, are explicitly represented, including public finance, taxation and social policy. The model represents goods that are external to the economy as for example damages to the environment. The internalization of externalities is achieved either through taxation or global system constraints, the shadow costs of which affect the decision of the economic agents.

In the GEM-E3-CAT firms are modelled to maximize their profits, constrained by the physical capital stock (fixed within the current period) and the available technology. Producers can change their physical capital stock over time through investment. Capital stock data by sector of production are not available either from GTAP or from EUROSTAT databases (it is computed in the calibration phase of the model).

Each producer (represented by an activity) is assumed to maximize profits, defined as the difference between the revenue earned and the cost of factors and intermediate inputs. Profits are maximized subject to its production technology. Domestic production is defined by branch. It is assumed that each branch produces a single good which is differentiated from any other good in the economy. Production functions in GEM-E3-CAT exhibit a nested separability scheme, involving capital (K), skilled and unskilled labour (L), energy (E) and materials (M) and are based on a CES neo-classical type of production function. The exact nesting scheme of production in GEM-E3-CAT has been selected to match available econometric data on KLEM substitution elasticities and the specific features of each activity. The optimal production behaviour can be represented in the primal or the dual formulation.

Households in the GEM-E3-CAT SAM are identified as a single social group (a single representative household is modeled). Households maximize their inter-temporal utility under an inter-temporal budget constraint. The demand functions are derived by solving the maximization problem, under general assumptions regarding expectations and steady state conditions. These demand functions allocate the expected income of the household, depending on the formulation of the problem, between consumption goods and future consumption (savings). This is the default formulation of households' behaviour. Alternatively household behavior is modelled so that the consumer allocates its expected income between present, future consumption and leisure. For household consumption, the model considers an allocation mechanism. The allocation mechanism considers durable and non-durable goods. Durable goods include cars, heating systems and electric appliances, and their use involves demand for non-durable goods, mainly energy (fuels and electricity).

Households receive income from their ownership of production factors, from other institutions and transfers from the rest of the world. Household expenditure is allocated between consumption, tax payment and savings. The representative household firstly decides on the allocation of its income between present and future consumption of goods. At a 2nd stage the household allocates its total consumption expenditure between the different consumption categories available. The consumption categories are split in non-durable consumption categories (food, culture etc.) and services from durable goods (cars, heating systems and electric appliances).

The following data are essential for the modeling of GEM-E3-CAT labor market: i) Skilled and unskilled labor force (total and by category) and ii) Unemployment rate for skilled and unskilled labour force. The GEM-E3-CAT model adopts the EUROSTAT definition of the labour force and thus it is computed by multiplying the participation rate to total active population. The databases mainly used to extract these data are the EUROSTAT, ILO and WorldBank.

Regarding foreign trade data, the GEM-E3-CAT model requires detailed bilateral trade matrices for all regions and commodities included in the model. GTAP database provides such matrices together with bilateral duties and transportation costs. For countries that are not identified separately in GTAP the UN Comtrade database is used in order to extract the relevant data.

GEM-E3-CAT is a recursive dynamic model (solved sequential over time). The sequential equilibria are linked through a motion equation regarding the update of the capital stock. According to the standard neoclassical approach agents investment decision depends on the rental cost of capital in the presence of adjustment costs and on its replacement cost. In GEM-E3-CAT agents have myopic expectations. Their future planning is based on current prices. It is assumed that investment that takes place in time t increases the production capacity at time t+1.

The investment demand of each branch is transformed into a demand by product, through fixed technical coefficients, derived from an investment matrix by product and ownership branch. The investment matrix is computed using the intermediate goods used in the production of capital goods and data provided in the literature on the inputs delivered by the sectors of the economy to the investments undertaken by each sector of production. The standard approach when no additional data are available is to use the same coefficient structure for each branch. This approach can be extended when additional information is available on investment by branch and on the structure of capital formation. In order to make changes in the investment matrix a simple procedure is followed. The initial investment matrix (with the same coefficients in each branch) is updated with the new investment shares. Then a RAS procedure is followed in order to ensure that the total of each row and column of the investment matrix remains constant and that the model remains balanced.

Government consumption is exogenous to the model. Public investment, assumed exogenous in the model, is performed by the branch of non-market services. Transfers to the households are computed as an exogenous rate per head times the population.

The equilibrium of the real part is achieved simultaneously in the goods market and in the labour market. In the goods market a distinction is made between tradable and non tradable goods. For the tradable goods the equilibrium condition refers to the equality between the supply of the composite good, related to the Armington equation, and the domestic demand for the composite good. This equilibrium combined with the sales identity, guarantees that total resource and total use in value for each good are identical. For the non tradable, there is no Armington assumption and the good is homogeneous. The equilibrium condition serves then to determine domestic production.

Once the model is calibrated, the next step is to define a reference case scenario. The reference case scenario includes all already decided policies. The key drivers of economic growth n the model are labour force, total factor productivity and the expectations on sectoral growth. The "counterfactual" equilibria can be computed by running the model under assumptions that diverge from those of the reference scenario. This corresponds to scenario building. In this case, a scenario is defined as a set

of changes of exogenous variables, for example a change in the tax rates. Changes of institutional regimes, that are expected to occur in the future, may be reflected by changing values of the appropriate elasticities and other model parameters that allow structural shifts (e.g. market regime). These changes are imposed on top of the assumptions of the reference scenario thereby modifying it. To perform a counterfactual simulation it is not necessary to re-calibrate the model.

A counterfactual simulation is characterized by its impact on consumer's welfare or through the equivalent variation of his welfare function. The equivalent variation can be, under reasonable assumptions, directly mapped to some of the endogenous variables of the model such as consumption, employment and price levels. The sign of the change of the equivalent variation gives then a measure of the policy's impact and burden sharing implications. The most important results, provided by GEM-E3-CAT, are:

- Dynamic annual projections in volume, value and deflators of national accounts by country
- Full Input-Output tables for each country/region identified in the model
- Distribution of income and transfers in the form of a social accounting matrix by country
- Employment, capital, investment by country and sector
- Greenhouse gasses, atmospheric emissions, pollution abatement capital, purchase of pollution permits and damages
- Consumption matrix by product and investment matrix by ownership branch
- Public finance, tax incidence and revenues by country
- Full bilateral trade matrices

9. APPENDIX B: THE DATABASE OF THE CATALAN REGION

9. APPENDIX B: THE DATABASE OF THE CATALAN REGION

The models database has been extended so as to include the Catalonia region as a separate entity. For this purpose, detailed base year data have been collected and reconcilliated. These data mainly refer to: i) Social Accounting Matrix, ii) Active population, labour force, participation rate, unemployment rate iii) Consumption by purpose and iv) bilateral trade. The main provider for Catalan base year statistics has been the statistical institute for Catalonia (IDESCAT). The IO table built for Catalonia was subtracted from the respective IO table of Spain. Below the final data used in the model are presented in tabular format.

Table 40. Intermediate Demand matrix of the Catalan economy (bn. € 2004)

	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	Total
01	0.22	0.00	0.00	0.00	0.00	0.00	0.00	4.12	0.30	0.05	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.00	0.00	0.07	0.00	0.02	0.06	**5.48**
02	0.00	0.00	0.00	0.08	0.00	0.01	0.04	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.15**
03	0.00	0.00	0.00	1.19	0.00	0.13	0.58	0.00	0.00	0.01	0.01	0.14	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.01	0.00	0.02	0.00	0.00	0.00	**2.15**
04	0.07	0.00	0.00	0.54	0.00	0.13	0.60	0.12	0.06	0.35	0.03	0.62	0.03	0.04	0.00	0.03	0.09	0.11	0.26	1.13	0.02	0.21	0.05	0.02	0.06	**4.57**
05	0.00	0.00	0.00	0.30	0.00	0.03	0.15	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	**0.55**
06	0.01	0.00	0.00	0.00	0.00	0.02	0.10	0.04	0.02	0.06	0.01	0.08	0.01	0.01	0.00	0.02	0.01	0.02	0.19	0.02	0.01	0.06	0.05	0.03	0.07	**0.87**
07	0.06	0.00	0.00	0.00	0.00	0.10	0.45	0.20	0.11	0.29	0.05	0.35	0.06	0.06	0.01	0.07	0.03	0.10	0.86	0.10	0.05	0.26	0.24	0.15	0.33	**3.93**
08	0.81	0.00	0.00	0.00	0.00	0.00	0.00	3.68	0.12	0.01	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.01	3.09	0.01	0.00	0.09	0.01	0.18	0.08	**8.26**
09	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.11	3.17	0.12	0.00	0.15	0.06	0.06	0.01	0.08	0.53	0.35	0.31	0.05	0.00	0.16	0.01	0.11	0.11	**5.41**
10	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.68	0.12	3.70	0.03	0.62	0.18	0.30	0.06	0.10	0.21	2.09	0.87	0.14	0.06	0.79	0.08	0.15	0.47	**10.67**
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.06	1.01	0.05	1.65	1.44	0.04	0.87	0.45	0.92	0.12	0.03	0.00	0.10	0.00	0.00	0.00	**6.76**
12	0.20	0.00	0.00	0.01	0.00	0.00	0.01	0.88	0.68	0.85	0.04	7.62	0.38	0.71	0.20	1.16	0.33	0.38	1.03	0.12	0.00	0.51	0.07	0.20	0.54	**15.92**
13	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.17	0.03	0.03	0.04	0.19	1.09	0.67	0.18	0.98	0.16	1.64	0.17	0.03	0.00	0.13	0.01	0.02	0.05	**5.61**
14	0.08	0.00	0.00	0.01	0.00	0.02	0.11	0.24	0.12	0.36	0.06	0.58	0.39	2.07	0.14	0.74	0.14	0.55	0.70	0.10	0.00	0.57	0.10	0.11	0.55	**7.74**
15	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.01	0.01	0.00	0.10	0.06	0.63	0.70	0.22	0.01	0.10	0.38	0.11	0.01	0.58	0.13	0.10	0.10	**3.30**
16	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.03	0.09	0.00	5.21	0.00	0.07	0.96	0.35	0.01	0.35	0.01	0.00	0.03	**7.16**
17	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.04	0.86	0.03	0.03	0.02	0.00	0.38	0.26	0.17	0.10	0.03	0.01	0.09	0.01	0.09	0.05	**2.19**
18	0.05	0.00	0.00	0.01	0.00	0.00	0.00	0.05	0.02	0.05	0.01	0.04	0.02	0.05	0.00	0.02	0.01	10.65	0.48	0.13	0.10	1.76	0.10	0.06	0.32	**13.93**
19	0.11	0.00	0.00	0.05	0.00	0.02	0.07	0.44	0.41	0.48	0.06	0.61	0.45	0.64	0.10	0.82	0.34	0.89	2.45	1.08	0.09	1.02	0.26	0.38	0.89	**11.66**
20	0.03	0.00	0.00	0.01	0.00	0.01	0.05	0.58	0.12	0.57	0.04	0.53	0.11	0.22	0.05	0.16	0.08	0.27	2.23	5.64	0.08	0.56	0.18	0.10	0.19	**11.80**
21	0.03	0.00	0.00	0.01	0.00	0.01	0.04	0.17	0.08	0.13	0.02	0.18	0.08	0.10	0.03	0.08	0.04	0.24	0.63	0.15	1.07	1.29	0.97	0.07	0.13	**5.53**
22	0.11	0.00	0.00	0.04	0.00	0.04	0.19	1.71	0.31	0.77	0.03	1.91	0.27	0.60	0.11	0.83	0.21	0.80	6.84	1.05	0.68	6.90	1.07	1.08	2.56	**28.14**
23	0.04	0.00	0.00	0.00	0.00	0.03	0.14	0.16	0.05	0.13	0.01	0.19	0.05	0.11	0.01	0.05	0.03	0.32	0.84	0.32	0.16	1.14	1.00	0.11	0.52	**5.41**
24	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.06	0.00	0.02	0.00	0.04	0.01	0.01	0.01	0.00	0.01	0.16	0.48	0.06	0.02	0.44	0.03	0.61	0.11	**2.12**
25	0.01	0.00	0.00	0.01	0.00	0.01	0.02	0.05	0.01	0.03	0.00	0.09	0.01	0.02	0.00	0.04	0.11	0.03	0.09	0.04	0.04	0.12	0.04	0.01	1.56	**2.33**
Total	**1.87**	**0.00**	**0.01**	**2.28**	**0.00**	**0.59**	**2.64**	**13.49**	**5.77**	**8.12**	**2.30**	**14.37**	**4.98**	**7.87**	**1.64**	**11.86**	**3.08**	**19.90**	**23.73**	**10.69**	**2.43**	**17.23**	**4.40**	**3.60**	**8.76**	**171.63**

Table 41. Supply side of the Catalan economy: Value added, taxes and imports (bn. € 2004)

	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Total Intermediate	1.87	0.00	0.01	2.28	0.00	0.59	2.64	13.49	5.77	8.12	2.30	14.37	4.98	7.87	1.64	11.86	3.08	19.90	23.73	10.69	2.43	17.23	4.40	3.60	8.76
Capital	1.26	0.00	0.00	0.38	0.00	0.25	1.13	1.72	0.74	2.12	0.56	2.66	0.91	1.71	0.16	1.17	0.35	7.64	15.41	3.68	2.58	18.59	3.47	2.12	3.94
Skilled Labour	0.03	0.00	0.00	0.04	0.00	0.03	0.12	0.62	0.36	0.75	0.08	1.31	0.52	1.05	0.11	0.55	0.20	1.83	3.77	0.92	1.70	5.78	0.73	1.90	7.86
Unskilled Labour	0.46	0.00	0.01	0.03	0.00	0.04	0.18	1.87	1.51	1.92	0.22	2.24	1.57	1.71	0.17	1.40	0.64	5.74	10.19	2.49	1.47	5.00	0.71	1.65	6.10
Reserves	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Value added	1.76	0.00	0.01	0.46	0.00	0.32	1.42	4.21	2.62	4.79	0.87	6.21	3.00	4.47	0.44	3.12	1.19	15.21	29.36	7.09	5.75	29.37	4.91	5.68	17.91
Production	3.63	0.00	0.02	2.74	0.01	0.90	4.07	17.70	8.39	12.91	3.17	20.58	7.98	12.33	2.08	14.98	4.27	35.11	53.09	17.78	8.18	46.60	9.31	9.28	26.67
Subsidies	-0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vat Taxes	0.04	0.00	0.00	0.19	0.00	0.03	0.13	0.80	0.62	0.13	0.00	0.19	0.01	0.08	0.06	0.18	0.32	0.20	1.34	0.11	0.01	0.16	0.66	0.40	0.01
Indirect Taxes	0.01	0.00	0.01	1.94	0.00	0.06	0.27	0.88	0.07	0.17	0.05	0.28	0.13	0.24	0.18	0.79	0.07	1.82	0.01	0.06	0.22	3.44	0.12	0.23	0.02
Duties	0.08	0.00	0.00	0.02	0.00	0.00	0.00	0.13	0.07	0.00	0.00	0.03	0.01	0.02	0.04	0.08	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Taxes	-0.12	0.00	0.00	2.15	0.00	0.09	0.40	1.81	0.76	0.30	0.00	0.49	0.14	0.34	0.29	1.05	0.40	2.02	1.35	0.17	0.23	3.60	0.78	0.63	0.02
Imports	4.98	0.15	2.11	3.45	0.54	0.35	1.60	8.52	5.23	5.76	5.83	14.13	2.95	10.74	5.32	11.26	1.81	0.00	1.54	4.53	1.28	6.45	0.59	1.38	0.00
CIF	0.23	0.03	0.10	0.11	0.03	0.00	0.00	0.14	0.18	0.16	0.13	0.25	0.04	0.16	0.06	0.12	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Supply	8.72	0.18	2.23	8.45	0.57	1.34	6.06	28.18	14.55	19.13	9.14	35.46	11.12	23.58	7.74	27.42	6.52	37.13	55.98	22.48	9.70	56.65	10.68	11.29	26.69

Table 42. Demand side of the Catalan economy (bn. € 2004)

	Total Intermediate demand	Household Consumption	Government Consumption	Investment	Exports	Total Demand
01	**5.48**	1.93	0.00	0.02	1.29	**8.72**
02	**0.15**	0.03	0.00	0.00	0.00	**0.18**
03	**2.15**	0.08	0.00	0.01	0.00	**2.23**
04	**4.57**	1.65	0.00	0.08	2.15	**8.45**
05	**0.55**	0.02	0.00	0.00	0.00	**0.57**
06	**0.87**	0.29	0.00	0.00	0.19	**1.34**
07	**3.93**	1.01	0.00	0.00	1.12	**6.06**
08	**8.26**	7.70	0.00	0.09	12.14	**28.18**
09	**5.41**	2.80	0.00	0.05	6.29	**14.55**
10	**10.67**	1.10	0.00	0.09	7.28	**19.13**
11	**6.76**	0.26	0.00	0.00	2.11	**9.14**
12	**15.92**	1.96	1.31	0.17	16.10	**35.46**
13	**5.61**	0.27	0.00	0.90	4.33	**11.12**
14	**7.74**	1.31	0.01	5.53	8.99	**23.58**
15	**3.30**	0.83	0.00	1.65	1.96	**7.74**
16	**7.16**	3.27	0.00	3.74	13.24	**27.42**
17	**2.19**	1.18	0.00	0.78	2.36	**6.52**
18	**13.93**	0.90	0.00	22.31	0.00	**37.13**
19	**11.66**	31.95	0.44	1.48	10.46	**55.98**
20	**11.80**	3.28	0.13	0.03	7.24	**22.48**
21	**5.53**	2.53	0.00	0.00	1.63	**9.70**
22	**28.14**	14.14	0.43	6.00	7.94	**56.65**
23	**5.41**	3.89	0.00	0.00	1.38	**10.68**
24	**2.12**	6.03	0.94	0.25	1.94	**11.29**
25	**2.33**	5.33	19.03	0.00	0.00	**26.69**
Total	**171.63**	93.76	22.29	43.17	110.16	**441.01**

Table 43. Catalan Consumption Matrix (bn. € 2004)

	FOOD BEVERAGES AND TOBACCO	CLOTHING AND FOOTWEAR	HOUSING AND WATER CHARGES	FUELS AND POWER	HOUSEHOLD EQUIPMENT AND OPERATION EXCL HEATING AND COOKING APPL	HEATING AND COOKING APPLIANCES	MEDICAL CARE AND HEALTH	PURCHASE OF VEHICLES	OPERATION OF PERSONAL TRANSPORT EQUIPMENT	TRANSPORT SERVICES	COMMUNICATION	RECREATIONAL SERVICES	MISCELLANEOUS GOODS AND SERVICES	EDUCATION
	01	02	03	04	05	06	07	08	09	10	11	12	13	14
01	1.86	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00
02	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
03	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
04	0.00	0.00	0.00	0.37	0.00	0.00	0.00	0.00	1.29	0.00	0.00	0.00	0.00	0.00
05	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
06	0.00	0.00	0.00	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
07	0.00	0.00	0.00	1.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08	7.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
09	0.21	2.49	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
10	0.00	0.00	0.06	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.81	0.00
11	0.00	0.00	0.01	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00
12	0.00	0.00	0.05	0.00	0.42	0.00	0.62	0.00	0.02	0.00	0.00	0.01	0.84	0.00
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.00
14	0.00	0.00	0.00	0.00	1.04	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.00	0.38	0.34	0.04	0.00	0.00	0.00	0.03	0.00	0.03	0.00
16	0.00	0.00	0.00	0.00	0.27	0.00	0.03	2.93	0.04	0.00	0.00	0.00	0.00	0.00
17	0.00	0.11	0.00	0.00	0.60	0.00	0.18	0.00	0.00	0.00	0.00	0.05	0.26	0.00
18	0.00	0.00	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.65	0.00	0.00	20.30	0.00	0.00
20	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.24	3.01	0.00	0.00	0.00	0.00
21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.53	0.00
22	0.00	0.08	13.24	0.00	0.02	0.10	0.00	0.48	0.05	0.00	0.00	0.08	0.09	0.00
23	0.00	0.00	0.31	0.00	0.24	0.00	0.00	0.00	0.00	0.00	2.05	0.03	1.27	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.03	0.00	0.00
25	0.00	0.30	0.63	0.00	0.46	0.00	1.33	0.00	0.06	0.00	0.00	0.00	1.68	0.88

Table 44. Catalan Exports by trading partner and commodity										
	DEU	ESP	FRA	ITA	PRT	CHN	REU	FSU	EME	ROW
01	0.10	0.39	0.18	0.12	0.08	0.01	0.18	0.07	0.07	0.09
02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
04	0.01	1.37	0.04	0.02	0.01	0.01	0.01	0.00	0.09	0.60
05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
06	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
07	0.02	0.84	0.00	0.00	0.18	0.00	0.02	0.00	0.03	0.03
08	0.40	7.56	1.06	0.58	0.36	0.08	0.97	0.13	0.21	0.78
09	0.22	3.39	0.70	0.29	0.28	0.07	0.55	0.05	0.32	0.42
10	0.13	4.80	0.59	0.17	0.22	0.03	0.33	0.04	0.42	0.55
11	0.07	1.29	0.21	0.08	0.08	0.01	0.14	0.01	0.08	0.14
12	0.83	8.27	1.11	0.82	0.56	0.18	1.50	0.07	0.76	2.01
13	0.15	2.98	0.28	0.15	0.21	0.02	0.21	0.01	0.11	0.22
14	0.38	4.55	0.62	0.26	0.35	0.09	0.76	0.08	0.87	1.04
15	0.13	0.58	0.29	0.19	0.15	0.02	0.30	0.01	0.10	0.18
16	1.19	4.69	1.91	0.78	0.47	0.05	2.50	0.08	0.50	1.09
17	0.04	1.48	0.20	0.07	0.12	0.01	0.13	0.01	0.09	0.21
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.72	5.84	0.55	0.23	0.09	0.08	1.63	0.07	0.15	1.11
20	0.27	3.97	0.20	0.10	0.03	0.03	0.90	0.02	0.10	0.66
21	0.06	0.84	0.08	0.01	0.01	0.01	0.37	0.01	0.02	0.21
22	0.44	4.70	0.23	0.20	0.03	0.08	0.90	0.02	0.12	1.21
23	0.10	0.54	0.08	0.04	0.03	0.02	0.25	0.01	0.06	0.25
24	0.02	1.10	0.07	0.03	0.00	0.00	0.04	0.00	0.05	0.63
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 45. Catalan Imports by trading partner and commodity										
	DEU	ESP	FRA	ITA	PRT	CHN	REU	FSU	EME	ROW
01	0.07	2.84	0.34	0.06	0.03	0.01	0.31	0.01	0.69	0.62
02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.12
03	0.00	0.05	0.00	0.00	0.00	0.00	0.01	0.25	0.66	1.14
04	0.01	1.91	0.03	0.45	0.00	0.00	0.10	0.22	0.41	0.31
05	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.34
06	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
07	0.00	1.58	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08	0.53	5.31	0.61	0.22	0.07	0.04	0.86	0.01	0.32	0.55
09	0.17	1.92	0.19	0.34	0.17	0.82	0.35	0.00	0.28	0.99
10	0.37	3.41	0.44	0.27	0.24	0.10	0.60	0.00	0.09	0.26
11	0.67	2.20	0.45	0.78	0.12	0.12	0.74	0.04	0.09	0.63
12	2.00	4.66	1.17	0.76	0.14	0.48	2.14	0.01	0.15	2.62
13	0.23	1.60	0.10	0.07	0.01	0.34	0.22	0.00	0.01	0.39
14	1.68	2.62	0.71	1.41	0.15	0.94	1.68	0.00	0.04	1.50
15	0.50	0.51	0.42	0.30	0.07	1.21	1.66	0.00	0.05	0.60
16	2.75	2.39	0.73	0.55	0.19	0.11	1.40	0.00	0.69	2.45
17	0.13	0.85	0.07	0.12	0.03	0.22	0.19	0.00	0.01	0.18
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	0.03	1.02	0.03	0.03	0.03	0.12	0.09	0.00	0.02	0.17
20	0.12	2.83	0.12	0.11	0.06	0.07	0.42	0.01	0.11	0.66
21	0.00	1.02	0.00	0.00	0.01	0.00	0.13	0.00	0.01	0.11
22	0.31	3.56	0.18	0.15	0.05	0.21	0.81	0.00	0.10	1.07
23	0.01	0.47	0.01	0.00	0.00	0.00	0.03	0.00	0.01	0.04
24	0.05	0.93	0.03	0.01	0.01	0.03	0.11	0.00	0.01	0.20
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

10. APPENDIX C: ECONOMIC EFFECTS OF SECESSION IN SPAIN AND THE EU

10. APPENDIX C: ECONOMIC EFFECTS OF SECESSION IN SPAIN AND THE EU

	EU		Spain (excluding Catalonia)	
	NPV* of GDP, 2015-2030	Cumulative GDP, 2015-2030	NPV of GDP, 2015-2030	Cumulative GDP, 2015-2030
Reference, in bn Euro 2004	163299.6	210032.6	10715.6	13856.5
S01, in bn Euro 2004	163197.2	209906.8	10495.3	13582.5
S01, % change from reference	-0.1	-0.1	-2.1	-2.0
S02, in bn Euro 2004	163147.3	209844.1	10442.4	13518.3
S02, % change from reference	-0.1	-0.1	-2.5	-2.4

* To calculate the Net Present Value (NPV) of the GDP a discount rate of 3% has been applied.
Source: GEM-E3-CAT

Detailed results can be found in the excel files accompanying this report. Below are provided the excel file names and a short description of their content.

- *GEME3_Data_Apendix.xlsx* file: includes the Social Accounting, Consumption, Trade and Bilateral duties matrices for Catalonia and Spain (presented in Appendix B of this report).
- *report_S01.xlsx* file : Includes the detailed GEM-E3-CAT results for all model regions for the default scenario S01 (mutual agreement on secession).
- *report_S01_GC.xlsx* file: Includes the detailed GEM-E3-CAT results for all model regions for the mutual agreement on secession scenario where additional revenues to the Catalan government are used for increase in public spending.
- *report_S01_SSC.xlsx* file: Includes the detailed GEM-E3-CAT results for all model regions for the mutual agreement on secession scenario where additional revenues to the Catalan government are used for the reduction of employers' social security contributions.
- *report_S01_Taxes.xlsx* file: Includes the detailed GEM-E3-CAT results for all model regions for the mutual agreement on secession scenario where additional revenues to the Catalan government are used for reduction of indirect taxes.

- *report_S02.xlsx* file : Includes the detailed GEM-E3-CAT results for all model regions for the default scenario S02 (unilateral secession).
- report_S02_GC.xlsx file: Includes the detailed GEM-E3-CAT results for all model regions for the unilateral secession scenario where additional revenues to the Catalan government are used for increase in public spending.
- report_S02_SSC.xlsx file: Includes the detailed GEM-E3-CAT results for all model regions for the unilateral secession scenario where additional revenues to the Catalan government are used for the reduction of employers' social security contributions.
- report_S02_Taxes.xlsx file: Includes the detailed GEM-E3-CAT results for all model regions for the unilateral secession scenario where additional revenues to the Catalan government are used for reduction of indirect taxes.