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Published: 01/01/2015

Document Version

Publisher's PDF, also known as Version of record

[Link to publication](#)

Citation for published version (APA):

Sinozic, T., Baypinar, M. B., Bergman, E. M., Hornyak, M., Kruzslicz, F., & Varga, A. (2015). *A Policy Research Method Case-Study: Generating and Extracting Evidence-based Policy Inferences from a large EC Framework Programme Project*. (SRE - Discussion Papers; No. 2015/04). WU Vienna University of Economics and Business.

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SRE-Discussion 2015/04

2015

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Abstract

In 2004 the European Neighbourhood Policy (ENP) was instituted following the greatest single enlargement of the European Union (EU), to support security and peaceful relations between the EU and neighbouring countries with a unified governance approach to economic, social and political aspects of international cooperation. This paper reports on an effort to develop and test a methodology for bridging social science research and policy communities on an important policy question that concerns comity between the EU and its Eurasian, Middle Eastern and North African neighbouring countries¹, although the approach applies to any broad policy issue for which multiple sources and types of research evidence are present. Five evaluative elements are developed and implemented whose complementary application result in a large set of policy inferences, a strategy of implementation, and researcher insights concerning the method. This case study suggests that the recommended evidence synthesis methodology has good potential for informing policy that is comprised of multiple elements, studied by large research teams, and enacted by diverse agents. The suggested methodology requires engagement by active researchers and policy experts in the formulation of policy options. It is put forward that improving the quality of evidence-informed policy will depend upon institutions and practices in the research and policy making communities.

1. Introduction

Informing of policies through scientific research is increasingly accepted as an institutional imperative at all levels of governance to improve the efficiency and effectiveness of policy. Translation of evidence into language and information that is useful and relevant to policy-makers is extremely difficult because different types of necessary evidence are sometimes conflicting or unobtainable, the values that drive policy-making and scientific inquiry are varied and occasionally in conflict, scientific inquiry and real-world events take place at divergent rates, and the cognitive disconnectedness between science and policy communities frustrates clear communication and feedback between them (Bogenschneider and Corbett, 2006). Policies formulated and implemented in consultation with scientists that proved effective in one context, may not work in another (Cartwright and Hardie, 2012). A number of methods have been developed to address these issues which are, broadly, literature-based such as meta-synthesis (for example, Sipe and Curlette, 1997), actor-based such as direct engagement and inclusion of individual scientists in the policy discourse and involvement in

¹ See http://www.ub.edu/searchproject/wp-content/uploads/2015/02/SEARCH-Deliv-6.-5_Policy-Guide_Final_DEF.pdf

policy formulation (such as is institutionalised in the National Institute for Health and Care Excellence in the UK), and policy analysis-based for evaluation and assessment of mechanisms and instruments prior to or following their implementation (for example, Weimar and Vining, 2005).

In the last decade or so, more integrated and less linear approaches have begun to gain popularity and, although sometimes criticised for their direct relationship with centralisation of decision-making power in specific multi-actor organisations (such as NICE for healthcare policies) (Birch and Gafni, 2002), have been praised for their more democratic approach to policy-making (Schlander, 2007). Pluralistic methods are perhaps most well-known in the fields of health and medical care (NICE, 2006), and over time they have been applied in other policy domains such as education and planning (Kasabov, 2008). Their applications have focused on the study of a single program, treatment regimen or technology area, but not the integration of contributions of relevant evidence from a team of 17 international researcher partners or to the broad spectrum of interrelated policy initiatives, theoretical perspectives and research domains of the sort represented by the ENP.

The ENP was instituted in 2004 after the largest single enlargement when ten new countries joined the EU. The goal of the ENP was to help maintain peace and prosperity at the Union's borders through trans-border policy initiatives encompassing economic, social and institutional change (COM 104, 2003). Programmes funded under the ENP framework are organised at local, inter-regional or bilateral levels, and a broad policy portfolio encompassing trade agreements, student exchange, technical support, direct investments, and institutions for democracy and human rights (COM 726, 2006; COM 774, 2007). In the period 2004-2007 the ENP cost the EU more than €1.690 million, a large amount by international standards (COM 774, 2007).

The ENP has been reviewed with respect to supports of trade and FDI, labour migration policies, innovation and diffusion of technology, and policies addressing institutional change (Wesselink and Boschma, 2012a). Despite the considerable investments, scale and scope of the programmes, the ENP has been criticised for not achieving its goals (Francois and Manchin, 2009). Its relatively modest impact has been explained by, for example, a lack of empirical foundations supporting the highly selective approach to trade liberalisation (Francois and Manchin, 2009). A further critique is the linear and atomistic approach to policy formulation, and the relative disengagement of policy-makers and scientific communities of EU neighbourhood countries in the discourse and processes of research, about which Adelle et al. (2012) have clearly warned. In 2015 the EU issued consultation demand for a reformulation of the European Neighbourhood Policy and Enlargement Negotiations (COM JOIN 6, 2015). Overall, there appears to be a move towards policy formulation processes which support diverse and scientifically informed knowledge inputs and a broad EU foreign policy portfolio, enveloped by the ENP.

This paper unfolds a case-studied shift towards scientifically informed policy by presenting and testing a methodology for policy formulation through evidence obtained and translated into policy *as part of the research process*. A mix of methods (synthesis of findings, managed policy inference extraction, active researcher engagement, text mining, meta-analysis and

empirical testing through modelling and questionnaire surveys) is used to elicit scientifically informed policy options that have been user-evaluated in policy contexts of home regions. While the methodology has been developed to assist policy formulation for the ENP, it is clearly applicable to other policy contexts featuring a broad range of topics, applicable theories, options and research partners.

The paper is structured as follows. Section two reviews some of the main aspects concerning the reporting of scientific evidence by researchers to inform policy. Section three describes the method for evidence synthesis and extraction of policy inferences, the empirical testing of policy recommendations, regionally-specific policy modelling, and internal evaluations of methods for in-research inference generation. Section four summarises the main elements of the proposed intervention methodology and offers some conclusions.

2. Avoidable limits of evidence-based policy

In this section we review some of the barriers to the use of research evidence in policy-making, and identify directions in the current literature that our study aims to complement. The use of research evidence for public policy has perhaps the most discussed formal imperative in the process of defence policy (Oughton, 2000) and public health policy formulation since the 1990s (Black, 2001). At about the same time, it was also attributed more importance for public policy in industry and innovation studies (Nelson, 1993) and regional studies (Tödting and Tripl, 2005; Uyarra, 2010). Some of the reasons for supporting the research-policy links have been to justify public expenditure on science, and to try to raise the effectiveness component in policy formulation (Bogenschneider and Corbett, 2006). A more critical perspective is that scientific evidence has been (mis)used by politicians as a ‘fig leaf’ (Black, 2001), for example, to support political strategies that may otherwise raise opposition. A central aspect of EU Framework Programmes (FPs), such as the Sixth and Seventh FPs, and, most recently, the “Societal Challenges” pillar of Horizon 2020, is the allocation of funds to scientific research which demonstrates potential for policy impact to help solve real-world problems (COM, 2011). Despite the formal imperative and supports, the transfer of research evidence into policy remains quite difficult (Lomas, 2000) for a variety of reasons.

Differences in culture between the scientific and political communities, such as in values and self-interest, can make it difficult to reach a common understanding of issues and actions (Bogenschneider and Corbett, 2006; Kasabov, 2008). These differences are particularly evident at the points of contact between them, for example when policy-relevant research is commissioned, and when policies for governmental research strategies are formulated. EU policy-makers have tried to address this problem by consulting scientists during the policy formulation process (Richardson, 2006). Such efforts for integration of the two communities in the research process has also lessened the problem of different time scales required for policy formulation, which was demonstrated in the case study presented in this paper.

The implementation of policy instruments from the vast amounts of research produced is not straightforward. Policy makers supplied with options that were generated without familiarity of the policy-making contexts may face huge challenges in public management that may lead to scientifically grounded strategies to be abandoned altogether (Guy, 2000). Indeed, a

corollary case can be made that nearly all reliably scientific research of relevance omits direct or useful mention of policy implications, apart from the few perfunctory gestures added hastily at the conclusion, as it principally seeks to advance theoretical propositions or guide further research.

Some social and economic problems have origins that are not easy to disentangle logically, such as poverty or housing shortages, sometimes called ‘wicked social problems’. The wicked problem may be so complex and bound up with multiple social and political relationships that immediate scientific solutions cannot be found (Bogenschneider and Corbett, 2006). In such cases it is important to understand the various aspects and perspectives on the problem at the different levels of abstraction, of the policy and research communities. The method proposed here connects the two communities through project-based feedback and structured interaction (for example, a dedicated policy conference, a questionnaire survey designed to evaluate fit, benefit and ease of implementation of the policies by policy professionals, the solicitation of researcher and policy professional feedback during the synthesis review of research documents).

A further important difficulty in developing research-based policy implications is that implementation contexts can be very different from one another, and “what works here might not work there” (Cartwright and Hardie, 2012). Policy effectiveness is dependent upon specific contextual conditions that might not always be met or known. The method proposed here includes an important element in which the policy inferences that are formulated are tested for their fit, benefit and ease of implementation with policy-makers and regional experts and evaluated in advanced versus basic regions of their adopting country contexts.

Several methods have been developed explicitly to extract policy relevant information from available research evidence, such as meta-analysis and meta-synthesis approaches that examine and rank findings that bear upon a very tightly defined policy or program of interest (Sipe and Curlett, 1997). Less has been developed for wider-ranging policy settings, such as regional contexts where numerous policy dimensions and agents need to be addressed. The method developed in this paper manages to deal with some of the main issues of integration of a range of actors and ‘fit’ to relevant context, and the distilling and extracting of large amounts of information into usable, readable and absorbable by people in a short time, that have been raised in the literature as being problematic in the translation of research results into policy.

The shift towards more integrative and varying methods of production of scientifically informed policy relevant information, has gained importance as the disadvantages of linear approaches have become more well-known and as the complexity of real-world problems has increased. For example, the Mode 2 approach to knowledge production put forward by Gibbons et al. (1994) suggests that scientific knowledge that draws on a variety of disciplines and that is generated ‘in the context of application’ is better suited to solve political, industrial and social problems. Viewing the production of politically relevant information in this way allows for a better alignment between the research and policy contexts, as emphasised by Lomas (2000).

These aspects were used to inform the research design used in the present case study. There are different types of policy questions that can inform the research process, and the extent and degree to which these can be integrated differ too. For example, the research can be conducted in such a way that its broad policy relevance is questioned along the way (through for example policy guide templates) or it can be a more intensive and structured process with specific policy effectiveness criteria such as (costs and benefits, political expediency, effectiveness, resources required, values and policy context, goals, side effects and evidence) (Cartwright and Hardie, 2012). The method developed in this paper encompasses both the guidance and the testing dimensions, including the potential utility of evidence-based policy as a research question.

3. Case study of the ENP: Development and application of an evidence-based policy method

This section describes the development and application of a methodology for extracting relevant and usable policy inferences from research for EU contexts where the policy space and the research findings are broad and multi-dimensional. Since its institutionalisation, the European Commission (EC) has formulated policies on an expansive range of topics for highly heterogeneous situations. As it has grown geographically, the EU issues have increased in breadth and complexity. Commissioning policy-relevant research through Framework Programmes has been one way in which the co-production of scientific evidence and policy has been supported. By framing its real-world problems as research questions for science, it has aimed to tackle some of the barriers to the flow of scientific information in the policy formulation process, as raised in the previous section, such as making evidence-based policy more participatory for both the scientific and policy communities, and lessening the ‘what works here might not work there’ problem facing the international component of its policies.

Most of the research carried out under the Framework Programmes and with this goal has used one or two methods (such as literature reviews and/or narrative synthesis), or no explicit method, to formulate policy implications from available research results. While the former are very important and useful methods for obtaining policy inferences on single issues and policy domains, it is argued in this paper that they are insufficient on their own for broad policy contexts such as the ENP where large amounts of original research are conducted that investigate the breadth of incompletely understood topics under its remit (trade, technology, skills, innovation, migration and others). The methodology reported in this section may provide helpful tools for developing and testing a broad policy portfolio within the process of research generation. The following sections describe the creation and application of the method to the process of policy generation for the ENP.

3.1 The research requirements necessary to support and improve the ENP

The SEARCH project focused on four broad dimensions important for the non-accession integration of the EU with Neighbourhood Countries² (NCs): trade and foreign direct investment, migration, technological innovation, and institutional environment (SEARCH Consortium, 2010). The aim of the project was to generate scientific contributions in these respective academic fields that would yield relevant and implementable findings to strengthen the economic and social policies of the ENP³ and to reorient them more to the satisfaction of EU and neighbouring countries.

The policy research team⁴ proceeded on the assumption that the ENP framework should be informed by policy relevant information sourced from scientific evidence on trade, migration, technology and institutional capital interactions between the EU and neighbouring countries. This called for a three-stage, project-long process: 1. Research design and reporting guidelines, 2. Extraction and elaboration of policy implications, and 3. Evaluation of significantly relevant policy options.

As a group, about 40% of members reported very little previous policy-related research experience, while 45% said half or more previous research was policy related, and a remaining 15% said nearly all.

² The neighbouring countries under the ENP remit are Algeria, Armenia, Azerbaijan, Egypt, Georgia, Israel, Jordan, Lebanon, Moldova, Morocco, Occupied Palestinian Territories, Tunisia, and Ukraine (COM 726, 2006).

³ A survey of project members concerning the methods employed in the project was conducted after all required reports had been submitted to assess how well they fared. These will be reported in a series of boxed comments at appropriate points in the following text.

⁴ From the outset, sufficient funds were allocated by the research consortium to the project's policy research team charged with developing the policy implications of the consortium's findings. The policy inference team consisted of members from the Vienna University of Economic and Business (Austria) and the University of Pecs (Hungary).

3.2 Research design and reporting guidelines

The requirements to improve the European Neighbourhood Policy helped define the conduct of research and its reporting. Ensuring the policy relevance of the research program took several forms. The EU already requires the submission of *Policy Briefs* for each broad research component conducted within its commissioned projects⁵. The guidelines for required deliverables contain many useful suggestions for the creation of centralised summaries of policy implications by project team leaders. However, previous research experience suggested that *Policy Briefs* are difficult to produce *ex post*—typically at project’s end—and at the (physical) distances between the policy team leaders and the researchers most proximate with the details of evidence generation (Bergman and Sinozic, 2014). To avoid this problem and to stress the policy relevance of research from the beginning, the policy team proposed that individual policy notes be prepared by authors of every individual scientific working paper, 105 working papers in total.

The guidelines for policy notes directed authors to reflect upon and make explicit: (1) the principal policy issues and policy arena (for example, EU and/or neighbouring country) addressed by each scientific paper, (2) the suitability of the research design in understanding the policy objectives, including evidence hierarchies and theoretical frameworks, and (3) summary of findings that can be used as policy-relevant information, as well as a discussion of how the findings support or contradict existing policies on these issues, the degree to which they are generalizable, and if possible, specific policy recommendations. The 105 policy notes were to be submitted contemporaneously with scientific working papers to ensure timely completion and to keep the policy focus fully in mind during the production of the working paper.

More than 90% of team members reported the guidelines had some-to-considerable effects on their approach to project research.

The simultaneous production of scientific working papers *and* policy notes that summarized policy inferences of their findings proved to be a challenge for scientists. Most have limited familiarity with policy, apart from cursory comments typically issued in their conclusions, and it was important that they be supported in this process. Extended guidance was provided through several rounds of structured review of many policy notes, followed by feedback to all authors. The overall problems identified during this interim evaluation were summarised and presented at the following project meeting to inform authors of further policy notes of the pitfalls and where special attention might be needed. Policy team members also attended every workshop conducted by the consortium as a means of following research progress and stressing the need for policy-relevant findings.

⁵ European Commission. 2010. *Communicating research for evidence-based policymaking*. ftp://ftp.cordis.europa.eu/pub/fp7/ssh/docs/guide-communicating-research_en.pdf

Guidelines to focus research efforts on policy insights were found to be of some-to-considerable usefulness by 4 out of 5 research team members.

The formulation of 17 *Policy Briefs* was supported and evaluated according to how consistently they matched the EC guidelines and templates, which often included specific guidance to ensure continued focus on the policy objectives of the project. Three *Policy Briefs* submitted early in the project were carefully evaluated for completeness, and the evaluations were distributed to all researchers to guide their efforts in preparing and revising subsequent *Policy Briefs*.

Roughly 6 in 10 research team members found reviews of obligatory *Policy Brief* drafts to be of some-to-considerable usefulness during preparation of their final deliverable versions.

Altogether, the project team produced 224 documents (105 scientific working papers, 105 policy notes, and 17 Policy Briefs) as the policy-oriented scientific output, out of which the policy team would synthesize and evaluate policy inferences or guidance for consideration of ENP policy officials. The question faced at this point was whether efforts to guide and support the policy relevance of scientific research actually resulted in potentially useful policy inferences. Reasoning that the project's scientific working papers should reference certain policy-relevant terms more often than published papers on the same topics, samples of the latter were drawn and both were evaluated with text mining techniques.

This was done by examining word frequencies in the language used in the research text corpus (scientific working papers in the project), compared to a text corpus of the most cited academic articles in the same research fields (trade, migration, technology, and institutional capital). We were reasonably certain that our procedure was sound, because the top five most frequent or common words in the working papers on migration and the most cited literature on that topic, as well as the working papers on trade and the most cited papers in that field, were virtually identical. A research orientation to Europe and its neighbouring countries at the national and regional levels was also evident, because the working papers showed much higher frequency for "Europe" (and its derivatives) than "America" (and its derivatives) than in the published academic literature. The terms urban and regional (and its derivatives) also appear more frequently in the working papers, in line with the research objectives.

More importantly, we see confirmation of the effectiveness of interventions is evident in the project working paper texts as the stem of the term "policy" and its derivatives occurred at a much higher frequency in the working papers on migration than in academic articles on the same topic. For example, for the research conducted on migration issues between the EU and its neighbouring countries, the term "policy" (stemmed, and its derivatives) occurs at the 37th

frequency rank, which is much higher than the term's 196th frequency rank in academic papers. In addition to team member evaluations of our approach, text mining of research papers prepared in accordance with project guidelines confirm the effectiveness of early and continuous guidance when organizing scientific research to generate policy inferences.

3.3 Extraction and elaboration of policy implications

The principal method used to extract policy implications from the large body of project documents was a modified form of evidence synthesis⁶. A synthesis approach to evidence is suitable when large volumes of evidence require sorting and pooling. Narrative synthesis is useful for identifying the main themes that occur in the evidence available (Greenhalgh, 2004). Some key themes, such as trade and migration were easy to identify because they reflected desiderata embedded in the original research call, their dominance in the ENP discussions, and research data or evidence gathered in the project. The importance of other implicit themes such as innovation, education, and cultural diversity became apparent only upon closer inspection of the research evidence and the policy briefs. Following the identification of main themes and thematic aspects, patterns within these were searched using techniques for pattern-matching (Miles and Huberman, 1994) such as relationships between factors, outcomes and policy actions, in line with the purpose of inquiry in each field. The factors, outcomes and policy actions, such as for example between mobility of high-skilled workers, innovation and policy supports for the building of research networks, such as documented in the working papers Moreno (2013) and Miguelez and Moreno (2013), were then summarised in one- or two-sentence policy statements (see Bergman and Sinozic, 2014 for the full list of policy statements) that correspond to each theme.

This effort produced 77 distinct policy implications that ranged across the four main thematic policy areas. These could have been submitted to the EU with little further elaboration. However, the policy team pursued a variety of further approaches to understand the importance or relevance of these policy implications for EC consideration.

3.4 Evaluation of policy options

Faced with a large number of policy implications, an evaluative program was seen as necessary to enhance their potential value to the policy-making community. This interest can be framed initially as a series of policy-relevant questions important to this community and the approaches used to provide answers:

1. In the search for synergies, what connections can be detected between individual policy themes or policy implications? **🔍 Text-mined policy correlations**
2. What policy inferences were identified by researchers as most related to their research objectives? **🔍 Research theme coordinator scoring**
3. Which policy inferences were seen by policy officials from neighbouring countries as most suited to their situations? **🔍 ENP policy official scoring**
4. Which individual or sets of policy inferences promised the greatest impact on growth and development? **🔍 Geographic Macro and Regional (GMR) model**

⁶ See Popay (2006) for discussion of issues that confront its practitioners.

5. Are there lessons available to EU and neighbouring country policy-makers for the effective application of policy-inferences? ⑦ **Stakeholder Policy Workshop**

3.4.1 Text-mined policy correlations

Text from research and policy documents was analysed using methods from computational linguistics to statistically examine relationships and thematic complementarities across the different policy areas. The overall data set consisted of 64⁷ Policy notes and 17 Policy Briefs. The data was analysed using the computational linguistics software Natural Language Toolkit with Python (NLTK)⁸, and pre-processed using standard corpus methods (stripping superfluous text, removal of stop-words), to produce a text corpus suitable for statistical testing⁹. The text corpus was organised in five sets according to the project themes (and work packages) of trade, migration, technology, and institutions and a comprehensive set containing all the text files.

The analysis of the text corpus involved term frequency, term co-occurrence, and Principal Component Analysis (PCA). Term frequency analysis identifies the most frequent terms in the individual sets. When coding based on the themes and thematic aspects guiding the project such as “trade”, “innovation”, and “mobility” was used to distinguish between important and less important terms, term co-occurrence analysis identified the terms that were most frequently related to the coded items. These two procedures provided the basis for PCA, which was done by analysing a matrix of policy documents from population of overall policy documents. PCA identifies patterns of co-occurring words and word environments *across documents*, so that co-occurrences at a level of statistical significance are classified as a distinct orthogonal component. Each component is characterised by its set of co-occurring words according to their strength of association, and the component is rated according to how much of the overall co-occurrence (variance) it represents. Finally, PCA permits one to identify which of the 81 documents were most closely associated with the underlying concepts embedded in each component¹⁰. Taken together, this showed some of the connections between the various sets (for example, trade and mobility) and the concepts embedded within each set.

Applying PCA to the text corpus produced the following results. First, six components were extracted, from which four provided the most robust findings. The first component, PC1, is dominated by the policy notes on trade, and PC4 is mainly derived from migration documents. PC2 and PC3 are evenly spread across all four topics, while PC5 and PC6 are more influenced by the technology and migration sets, respectively.

Policy complementarities were examined through a combination of ordering and coding to examine separately for each policy area the components and the group of documents with

⁷ Although 105 Policy Notes were produced, only 64 possessed sufficient information for analysis.

⁸ More information on the software is available under <http://www.nltk.org/>

⁹ See Appendix II, “Text acquisition and analysis” of Bergman and Sinozic (2014) for further details.

¹⁰ For a more authoritative and complete description of how PCA is performed and interpreted please see <http://support.sas.com/publishing/pubcat/chaps/55129.pdf>.

which they are most closely associated. Starting with the most important individual component, trade is the largest and most important policy theme that is connected with other research areas, reflecting its importance in EU integration and in previous ENP efforts. Innovation is the second most important policy theme, which is present in four of the six components. Policy documents where trade policy, migration policy or innovation policy play an important role dominate one or more components, while institutions do not dominate any single component, but like trade are present in all of them.

About 3 of 4 team members who commented on our use of text-mining techniques in preparing the policy results found them of some-to-considerable usefulness.

Based purely on these interconnections, one can conclude that trade and innovation are the most synergistic and dominant policy themes among those tested, although migration policies dominate key sets of overlapping policies. Each of the six policy components¹¹ provide working hypotheses about important connections between policy concepts generated by project research. Further efforts to specify a portfolio of interlocking policy elements could start with any policy inference and the component with which its document is closely correlated, proceeding next to detailed examination of the other closely associated documents in the same component. The opposite result can also be found: there were no measurable connections between the documents that comprise PC1 and PC3 (*mainly Trade/FDI*) and those in PC2, PC4, PC5 and PC6 (*mainly Innovation*). These represent quite different and perhaps alternative policy approaches, a distinction we exploit further in following evaluations.

3.4.2 Research theme-coordinator scoring

To improve the validity of the 77 policy inferences synthesised from research paper findings and pattern-matching results described in 3.4.1, we returned them to the research coordinators of each theme and asked that they reflect on the guidelines to help select the most important policy inferences. They were asked to consider two main aspects: (1) connection between the inference and the research findings, and (2) clarity and comprehension.

For the first criterion, the link between the policy inference and the research findings needed to be made explicit to help ensure their validity. Second, the language used in the inferences needed to be comprehensible to lay persons, without the use of overly technical or abstract terms. The results of this review were used to reformulate or to discard inferences that were too similar, incorrect, or inappropriate given the research and the context. This exercise winnowed the list of inferences down to 39, which met the criteria, and were ready to be assessed by policy experts familiar with the possible adopting contexts in the EU Neighbourhood.

¹¹ Further details concerning the exact composition of each principal component can be found in Bergman and Sinozic (2014).

3.4.3 ENP policy-official scoring

Policies are quite unlikely to succeed if seen as inappropriate to the circumstances where applied. Since the ENP had only marginal success to date, due in part to specific aspects of its policy portfolio, a survey of policy officials from a sample of European neighbouring countries was undertaken. The respondents for the questionnaire survey were selected in two stages. The first stage took place at the start of the project to select nine advisory board members, based on their expertise on trade, migration, technology and institutional aspects in the EU and neighbourhood countries. Further criteria were a balanced representation from government, non-government organisations, and academia, and individuals who are able and keen to participate in the managed processes of evaluation and feedback¹² on policy information sourced from our findings throughout the entire duration of the project. The second stage was the selection of additional respondents, which took place during the organisation of the questionnaire survey. In all, 29 individuals were chosen who had experience in policy formulation in the ENP South and ENP East respectively,¹³ through the use of snowball methods by two independent research organisations in Spain and in Greece.

The survey questions were informed by the literature on evidence-based policy (Bogenschneider and Corbett, 2010; Cartwright and Hardie, 2012). This literature defines policy effectiveness as relevance, feasibility, interaction with other policies (discussed previously), and ease of implementation, and suggests that the likelihood of policy success is increased with knowledge exchange between scientists and policy-makers. The questionnaire survey addressed these requirements by asking our survey respondents a fixed set of three questions about individual policy inferences. An online survey tool was selected to make it quicker and easier to respond, and thereby raise the response rate. We pre-tested our online questionnaire on 36 members of our research consortium and received 21 responses, which helped refine the questionnaire. Once refined, the questionnaire was pre-tested a second time with three researchers, who continued to provide feedback until diminishing returns on changes set in and a final version was decided upon. The online questionnaire survey asked the following three closed questions to elicit specific views on fit, benefit, and ease of implementation on each single policy inference. Using Likert-scale responses, each inference was scored:

- How well does this policy fit the circumstances of your region? (5=fits perfectly, 1=does not fit)
- How likely is this policy to benefit your region)? (5=high benefits, 1=no benefits)

¹² These were the questionnaire survey, the roundtable discussions, and review of policy documents.

¹³ The pre-selection of survey respondents always introduces some biases (Moser and Kalton, 1971), and we tried to minimise bias by obtaining a balance between respondents between the ENC East and Southern countries, and a balance between individuals from academia, government and non-government organisations. Further biases that may have been introduced with our pre-selection (such as choosing respondents that were known by our consortium, and thus had a higher probability of having a positive attitude towards EU interventions) are accepted as part of the survey process and overall we found that the benefits of pre-selection (higher rate of obtaining informed responses) outweighed the possible risks of bias.

- How easy would it be to implement this policy in your region? (5=very easy, 1=very difficult)

These questions were applied to each of the 39 policies judged by researcher coordinators as the most interesting, novel or provocative out of full 77 implications originally synthesized. In all, 12 trade policies, 11 migration policies, 7 technology policies, and 9 institutional policies were evaluated by the surveyed policy experts. No weighting was applied to the criteria of fit, benefit and ease of implementation when calculating overall scores. The policies were ranked according to the total of the values to all three criteria. Overall, technology and innovation policies ranked highest, followed by trade, migration, and institutions. Furthermore, the ranking of the policies according to the individual criteria show a more finely grained picture and scope for calibrated interventions during policy implementation.

Our use of regional policy officials to score possible policy inferences was found to be of some-to-considerable usefulness by 4 of 5 research team members.

Clearly, there are different trade-offs in the implementation of the different policies for the various regions, and identifying and discussing these is an important part of any process of policy formulation and implementation. However, innovation and trade policies again scored highest among policy makers from the EU's neighbouring countries.

3.4.4 Geographic Macro and Regional (GMR) model

As the ENP is intended to promote growth and prosperity in neighbouring countries, there is considerable interest in learning whether some policies are more effective than others in its promotion. Some of the policy inferences derived from the procedures outlined earlier were tested for the extent and degree of regional impact on economic growth in EU neighbouring countries using the Geographic Macro and Regional (GMR)¹⁴ modelling approach (Varga and Baypinar, 2014¹⁵). The TR72 Kayseri Sivas Yozgat NUTS II Region in Turkey (hereafter Kayseri Region) was chosen because of the availability of reliable data, and its comparability to regions in other neighbouring countries.

The policy inference data used in the model was compiled by ordering the policy inferences into the two groups found most important in earlier evaluation steps. These formed two scenarios of policies for regional economic development, namely the 'Conservative' Scenario and the 'Technology development' Scenario that stresses innovation policies. The conservative approach to development targets the strengthening of existing patterns of trade and FDI, and migration and the labour market, with a particular focus on regions of the neighbouring countries at the lowest relative levels of development. The technology scenario

¹⁴ For a detailed and technical description of the GMR model, please see Varga et al. (2013)

¹⁵ Varga and Baypinar (2014) provide the detailed technical account of the data analysis and results. A shorter version for reporting purposes is provided in Bergman and Sinozic (2015).

focuses on the unexploited potential of neighbouring country regions, such as institutional advancement, labour mobility, technology adoption and the upgrading of capabilities for technological innovation.

The two scenarios were run separately for the Kayseri Region to assess their likely impacts on GDP, national GDP and regional inequalities in Turkey. These results provided the basis for a comparison of the effectiveness of the two groups of policy options, specifically:

1. Conservative Scenario: neighbouring countries should intensify trade relationships with Central and Eastern European (CEE) regions, where competition is lower than in the rest of the EU.
2. Technology Scenario: neighbouring countries should develop regional innovation infrastructures (for example, human capital and R&D capabilities) which are required for competitiveness in global markets.

The interventions in the simulations were based on the 2014-2020 budget of the Instrument for Pre-Accession (IPA) of the EU. It was assumed that the Kayseri Region would achieve the same degree of IPA financing for its future projects as it had in the previous planning period of 2007-2013. A Baseline Scenario was established for comparison which assumed that the policy applied during the 2014-2020 period in the Kayseri Region did not change since the 2007-2013 period. It was assumed that different distributions of the same total IPA funding would be used in the three scenarios. To operationalize this idea, IPA funds were assumed to be used in future projects categorised in three classes: private investment support, R&D funding, and development of human resources (education).

In the Conservative Scenario it was assumed that the IPA budget was mainly used for investment in traditional industries considered competitive in those countries that joined the Union from 2007 onwards. Thus, in this scenario, it was assumed that the IPA budget was allocated totally to private investment support. In contrast, the assumption in the Technology Scenario is that funds be used to upgrade industries and regional innovation infrastructures. Operationalization of the Technology Scenario required that the potential allocation of IPA funds among alternative policy options should be elaborated. Following a literature review of the research conducted in the project, it was decided that the IPA budget be allocated in equal amounts across three categories of policy interventions: private investment support, R&D funding, and development of human resources.

In addition to the regional policy measures, other instruments were included in the scenarios based on knowledge of trade policy strategies. In the Conservative Scenario, it was assumed that the Turkish government takes steps to intensify trade relations with EU CEE countries by reducing regulations on exports, and that a new highway would be constructed to improve the connection between the Kayseri Region and the Port of Samsun on the Black Sea. This would result in the fall of transport costs of bulk and low technology products from the Kayseri Region, raising their competitiveness in the CEE markets. It was assumed in the simulations that the highway be opened from 2018 onwards.

In the Technology Scenario, the set of financial instruments is extended to policy measures that support technological innovation, as suggested by project research. The first set of policy measures target more successful participation in EU funded research projects. The quality of EU research networks is measured by the Ego Network Quality (ENQ) index (Sebestyén and Varga, 2013). Higher values of this index reflect participation of the region in higher quality networks, as measured by the number and initial knowledge of immediate research partners, their willingness to interact with each other, and the extent to which the immediate partners can help access novel knowledge by being connected to more distant partners in the entire EU research collaboration network. It was assumed that the Turkish Science and Technology Policy and partnerships with the Horizon 2020 programme are successful, which increases the ENQ index of the Kayseri Region by 10% over the seven year time period during 2014-2020.

The key findings of the analysis are as follows¹⁶. In the Conservative Scenario, the highest impact of investment support on GDP growth is estimated for 2022 at a value of about 0.045% compared to the Baseline Scenario. Furthermore, following the policy suggestions from the research, it was assumed that the Turkish government successfully introduces policy measures to increase export demand. According to the results obtained in the simulation, a 2% increase in exports increased the peak impact in 2022 to about 0.075%. Improving accessibility to the Port of Samsun starts to increase regional GDP in 2022. The planned highway would increase the impact of export promotion policies over time. The peak total impact of all policies in the Conservative Scenario is about 0.075%, estimated for the year 2022.

For the Technology Scenario, the results show that investment support paired solely with *R&D funding* has a relatively minor impact compared to impacts in the Conservative and Baseline Scenarios. The peak year is 2021 with an increase in regional GDP of about 0.0025%. However, it may be assumed that policy interventions that improve participation of the Kayseri Region in Horizon 2020 Program will lead to more efficient utilization of the regional R&D budget. One third of the IPA budget (in this variation of the Technology Scenario) is therefore instead allocated to human capital development, which, according to the results of the simulation is one of the most effective knowledge-based policies for the region. Investments in education increase the peak impact in 2021 to 0.4%. Increases in remittances do not have substantial impact on human capital or on regional GDP. Moreover, improving accessibility through construction of the highway does not seem to improve the impact of knowledge-based policies on GDP in the period under study.

Comparing the impact of the baseline scenario and two policy strategy scenarios on regional GDP, national GDP and on regional inequalities shows that the Conservative Scenario is not as effective as the Baseline Scenario. That is to say, using EU support for pure private investment support, even when coupled with export promotion, does not seem to be more effective than the current policy for spending of the regional IPA budget. With respect to both the baseline scenario and the Conservative Scenario, the Technology Scenario seems to be the more realistic and rewarding policy option. Increased R&D expenditures and private investment support, coupled with better positioning in EU knowledge networks, and

¹⁶ For the full set of findings please see Varga and Baypinar (2014).

investments in human capital, could transform favoured regions such as the Kayseri Region into a more successful region in the longer run. Simulations made by GMR-Turkey Model demonstrate that policy measures based on the Technology Scenario have the highest positive impact on both Turkey's national GDP and regional cohesion.

Overall, the results suggest that in the neighbouring countries to the EU, where some potential for knowledge augmentation already exists, the support of technological development via policies such as the promotion of innovation, R&D, human capital and international knowledge transfers is extremely important in decreasing regional inequalities and increasing growth at both the regional and the national level.

3.4.5 Stakeholder Policy Workshop

Evaluative views of individual policies and broader policy issues were obtained from stakeholder participants during the Final Policy Conference of the research project, where policy officials from the EU and neighbouring countries, and the researchers who had produced the evidence on which the policies were based, met for two days of presentations and structured discussions. Each session considered one of the main policy themes (trade, migration, technology, and institutions). In each session, one presentation was held by the researchers who had conducted the research on the individual theme, and the following two or three presentations were held by policy makers from the EU and neighbouring countries who were asked to present the core aspects of implementing the policies in their regions.

About 3 or 4 team members considered the Policy Workshop to be of some-to-considerable usefulness in formulating and testing policy implications.

Attention was drawn to the differences between the neighbouring countries in the Eastern and the Southern borders of the EU, which strongly influence the effectiveness of the ENP framework. For example language, alphabet and culture, which for the Eastern neighbouring countries are more similar to EU member states. The differences affect the likelihood of finding partners for research collaborations, and the ease of communication during the research process (see also Autant-Bernard and Chalaye, 2013). Further issues focused on the difficulties neighbouring countries faced when lowering trade barriers without implementing complementary policies to support skills augmentation and the expansion of domestic capabilities. Furthermore, weaknesses in governance systems to develop data collection and management capacities were deemed as important. It was repeatedly stated that a homogenous approach towards development for such a broad range of countries that face very different conditions would be less effective than a more targeted approach which took into account national and regional contextual specificities. These were among the most important considerations that stakeholders advanced to be taken on board during the continuing processes of refining and updating the ENP.

4 Conclusions

This paper presented an ensemble of methods for evidence synthesis and policy extraction from a large number of widely commissioned research papers. The approach is intended to produce the cumulative assembly and integration of research findings that permit the translation of research evidence into policy relevant information. The core elements of the method, such as the use of synthesis and pattern-matching techniques for the extraction of policy information into themes, outcomes and actions in single sentences, the search for correlations of policy areas across research and policy papers using text-mining, the scoring of policy implications by researchers, the scoring of policy options by policy experts, macro-regional modelling of policy scenarios, and the stakeholder policy workshop, are intended as tools that can be adapted to fit different research policy contexts. In this paper, the tools were applied to the generation of policy options for the ENP from a large body of research on EU and Neighbouring Country interactions in the areas of trade, migration, technology, and institutions.

Project researchers were asked to weigh in on the overall policy approach. When queried if the various guidelines and support provided by the policy team had an effect on their project research, 25% reported a considerable effect, 68% some effect, and 7% no effect. Taken together, there appear to be worthwhile payoffs from efforts to stimulate improved research designs and policy reporting within large-scale research projects.

Extracting relevant bits of information from large volumes of text through narrative synthesis and searching for patterns between factors, outcomes and policy actions, to formulate concise policy statements is important when bodies of research are vast. A search for correlations using techniques from computational linguistics provides another set of results through a triangulation step, and allows for the discovery of connections among text that may otherwise remain overlooked. The repeated integration of researchers in these processes is important to test for validity, accuracy and clarity of the policy implications. Structured feedback from researchers also makes the results more transparent, easier to link back to evidence, and by 'raising the bar' in the articulation of policy options, reduces the problems that occur when policy is produced as an afterthought to research (Tranfield et al., 2003). Including policy experts and user-stakeholders in the evaluations of policy options with simple scoring methods and workshops meets the demand of evaluating policies during the process of formulation. Modelling policy options on real-world scenarios, such as through the macro-regional model carried out in our study, tests the options for their desired case impact of growth and development in regions. The advantages of the methods developed and employed in this case study raises the odds of implementability of evidence-informed policy options.

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