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Maria Stella Righettini – University of Padova (IT)

Mariastella.righettini@unipd.it

Stefano Sbalchiero – University of Padova (IT)

Stefano.sbalchiero@unipd.it

**Institutions and temporal dynamics of policy topics: Empirical evidences from
the Structural Topic Model Analysis of development policies in Asia**

Abstract

This paper aims to contribute to the methodological debate around the validity of the Punctuation Equilibrium Theory (PET) in the detection of spatial-temporal patterns of policy topics. It analyzes the output of a multilateral financial organization, the Asian Development Bank (ADB), whose activity has a major impact on developmental policies in the Asian region in a number of policy sectors. Using an automatic extraction of policy topics through text mining and Latent Dirichlet Allocation (LDA), we analyzed a data-base of 1917 titles and descriptions of development projects funded and evaluated by the ADB from 1995 to 2015, a period covering the last two financial crises in Asia. This paper introduces a twofold innovation in PET methods, the automatic extraction of policy topics and its application to the evaluation phase of policy cycle and goes on to isolate different kinds of punctuated temporal and spatial changes in development policies pursued and to interpret these changes as the results of both endogenous and exogenous factors.

Introduction

There are various ways to bring about policy change, concentrating on ideas, outputs, agenda setting, formulation, implementation and results. As evidenced by the vast literature on PET and on the detection of temporal and spatial patterns of policy change, the role of analysts in coding and interpreting events and validating normative interpretations in the medium-long term is a problem common to different approaches such as the identification of punctuations over time and their explanations (Howlett, Rayner, 2006; Baumgartner & Jones, 2009; Howlett, Goetz, 2014).

This paper seeks to contribute to the advancement of methodological debate around the validity of the Punctuation Equilibrium Theory (PET) in the detection of spatial-temporal patterns of policy topics and, using output data related to a multilateral financial organization, the Asian Development Bank (ADB), it introduces a twofold innovation in PET framework and method. The first innovation is related to the kind of output: Along the policy cycle we can have different kinds of outputs; we considered evaluation outputs, that is to say, projects that reached the end of their implementation and were under performance assessment by ADB. The main reason for this approach is that a growing body of literature dealing with multilateral organizations examines factors associated with success or failure at the aid project and program levels, considering a

number of endogenous and exogenous causal factors (Feeny, Vu Vuong, 2017). The evaluation outputs close the policy cycle and, as a result of exogenous and endogenous incoming information and decision maker preferences, increasingly set the stream of future policy agenda. However, performance evaluation is a policy maker option and, as evidenced by the existing literature (*inter alia* Woolmann, 2007), the choice to set up an ex-ante or an ex-post evaluation process can affect the attention to policy issues over time in various ways. Once introduced, evaluation practices affect both the way in which policy makers conceptualize and observe the real world change and the way they causally link observed change to policy measures and to resource allocation.

The second innovation involves using the automatic extraction of policy topics through Latent Dirichlet Allocation (LDA) from a database of 1917 titles and descriptions of development projects funded and evaluated by the ADB between 1995 and 2015 in order to isolate different kinds of punctuations in development policies and to test the validity of the PET framework. The reliability of coding within wide cross-country comparisons is perceived as one of the most crucial methodological problems in longitudinal analysis, as evidenced by the Comparative agenda project (Cap).

We were particularly interested in testing the validity of PET as a theory of disproportionate information processing, according to which punctuations are driven by external pressure or crises, meant as a “disjoint and abrupt process of policy change”, in response to information limits (Jones & Baumgartner, 2012:3). The present paper is structured as follows: The first section examines the main literature on multilateral organizations and the ADB dealing with the measurement of the temporal evolution of development policies and change in a number of policy sectors. The second section concentrates on the different PET approaches and on the hypothesis developed to innovate research methodology in order to detecting developmental policy topics over time and space. The third section provides details on the data and methodology employed to examine determinants of punctuations in ADB developmental policies. Section four presents the different kinds of temporal and spatial patterns evidenced by LDA. Finally, in section five we discuss some implications together with suggestions for future research.

1. Measuring multilateral organization developmental policies.

The measurement of output and impact changes is becoming a key question in both global and regional and sub-regional political, social and economic systems, and it is also becoming a key issue in financial and multilateral organizations that support and finance developmental policies

(White, 2009; Buntaine, 2011). This section deals with the development policies of the ADB, an autonomous international organization, similar to the World Bank and the African Development Bank, established with the aim of channeling financial resources in the form of loans for specific projects from developed to developing countries.

Similarly to other multilateral organizations (Levy, 1993; Woods, 2001; Gilbert, Vines, 2006), the ADB was established in the early 1960s by Articles of Agreement, which had the status of a treaty, as a multilateral financial organization that was meant to be primarily Asian in character, with the objective of fostering long-term economic growth, social development and cooperation in its member countries in what was then one of the world's poorest regions (Wihtol, 1988; Kappagoda, 1995). The ADB assists its member and partner nations by providing loans, technical assistance, grants, and equity investments to promote social and economic development. Managed by a President and a large internationally recruited staff, the organization's authority is vested by a board of governors, each of whom is a representative of an individual member country, generally the minister of finance or the head of the country's central bank; the ADB's board of governors delegates the organization's board of directors. The ADB lends money to country member governments for specific projects or programs and, as evidenced by existing literature, developing countries often modify their development policies and priorities for entire sectors of their economies in response to the suggestions and requirements of the Bank (Buntaine, 2011; 2013a; 2013b). The financial crisis in Asia in 1997 had a profound impact on the ADB's operations and policy. From then onwards, the ADB has acted as central actor in wider financial, trade and economic cooperation between Asian countries and their national central banks. The growing risk and uncertainty affecting both the financial stability of the banking sector and the social and economic development of ADB country members (ADB, 2016) led ADB governors to adopt a new, more general framework of risk management, introducing ex-ante assessment of credit risks and conditionality for loan access. The ADB also established a new division, the Risk Management Division (RMD), which plays a key role in its new and more prudential investment strategies. Since 2000 the RMD since has carried out monitoring and performance measurement in comparison with external benchmarks. Its duties were later incorporated into the newly established Risk Management Unit. The new Asset and Liability Management (ALM) framework, covering both sovereign and non-sovereign lending operations, set up a new methodology to deal with the cognitive challenges and pressures caused by the financial crisis.

In 1997, the ADB approved "a new financial planning framework for the management of ADB resources" aimed at enabling more efficient use of non-donor and donor resources and at increasing

the volume of such resources. New special funds were also created for poverty reduction in those countries in the region most severely affected by the Asian financial crisis (Indonesia, the Republic of Korea, Malaysia, the Philippines and Thailand). Assistance was directed primarily toward the support of cross country relations, “human resource development, institutional strengthening, supervision of regulation, public sector, the creation of social safety nets and environmental protection” (ADB, 2016:54). Both member and donor countries agreed on a new set of operational priorities, including a “more robust performance-based allocation system and greater support for strengthening good governance in the region, promoting gender equality, improving the environment and promoting *cross country* cooperation” (ADB, 2016; 54). A few years later, new special funds were also created to cope with natural disasters in the region, such as the tsunami that hit Asia in December 2004 and the earthquake in Pakistan in November 2005, aimed at providing relief and reconstruction assistance. In September 2007, the Board of Directors approved a revised financial framework that limited grant eligibility for the Asian Development Fund (ADF) to a certain number of low-income countries. To avoid rewarding poor performance, the ADB gradually increased conditionality and prudential financial management, reducing its assistance (20% of grant allocations), and put it under existing performance assessments. For the remaining 80% countries admitted could receive 100% of funding.

Scholars have documented, in various ways, development bank activities and the results, not always positive, that financed projects and programs have exerted in developing countries (Rich, 1985). The main difficulty in examining financed project evolution stems from the fact that they are planned as far as a decade or more in advance. From empirical research in the field of development policies and multilateral organizations, we know that for a long time the two sectors receiving the most support from developmental banks (Buntaine, 2011) were agriculture and energy. Until recently, empirical research was limited to individual policy areas and was conducted through narrative techniques (interviews) or through the analysis of the relationship between macro-economic data. Empirical evidence from project cycles were difficult to trace back and to detect in the medium-long term due to a lack of public information regarding projects goals, content and impacts and to the scarce use of quantitative approaches. Recent findings from Asian Development Bank interventions reveal that a positive association between sector variable and policy success do however exist, and in fact “sector variables explain a greater proportion of variations in ADB outcomes” (Feeny and Vu Vuong, 2017:338). ADB projects appear to have a much higher rate of success in some sectors (education, energy, transportation and ICT) than they do in others (agriculture, natural resources and finance) (Feeny and Vu Vuong, 2017). A direct result of this is

that rational investors prioritize agenda attention in the sector in which they expect a comparative advantage or a higher probability of success.

2. Theory and hypotheses.

The PET approach, borrowed from Gould and Eldredge's biological theory, argues that within long periods of gradual evolution, changes can arise suddenly. By analogy, in policy making processes long periods of gradual changes can be interspersed with occasional sharp changes. PET analysis is applied to longer-run policy development, so as to incorporate both short- and long-run temporal changes in order to better appreciate and analyze policy complexity. As a theory of policy dynamics, the PET focuses on the mechanisms that lead to policy change and challenges standard models of policy change based on elections, arguing that major policy change occurs in the absence of electoral change. In fact, what we see is the great influence exerted, at the cross country and regional levels, by non-political organizations in driving policy change at the state level. By examining these changes over time and by focusing on cross-country agenda setting, PET scholars noted that actors across the entire political system collectively shift attention. PET has evolved along four phases to capture long run trends in policy change: the study of policy output; the study of attention and framing; the study of information processing and, finally, the study of diffusion across institutions (Shipan, Volden, 2008; Baumgartner et al., 2009). In the first phase, systematic and comparable measures of policy change over time are provided by different types of policy outputs, such as hearings and budgets (Jones, Baumgartner, and True, 1995, 1996, 1998; True 2000; Jones, Sulkin and Larsen 2003; Jones and Baumgartner 2005), and legislation (John and Bevan, 2012). Any kind of output quantifies policy decisions made in response to incoming information, the preferences of decision makers, and institutional structure (Workman, Jones, Jochim, 2009). The collection, management and prioritization of information regarding outputs and policy change implies a greater attention to the ideas and pressures of current and consolidated policy agenda aiming to promote *policy change*. The allocation of attention (Downs, 1972) is meant as the ability of policy makers, and consequently of organizations, to allocate and reallocate their attention along the policy cycle in order to reach development goals and significant results (Downs, 1972; Peters & Hogwood, 1985). Policy cycle scholars have emphasized both the manner in which political and non-political actors and institutions can promote both change and stability in a policy-by-policy adjustment process. The adjustment process relies on the allocation of public attention (Downs, 1972) and the ability of policy makers or organizations to allocate and reallocate their attention along the policy cycle in order to solve a given problem and achieve a significant measure of

success (Downs, 1972; Peters & Hogwood, 1985). The policy cycle includes the evaluation process and feedback. The attention of political organizations is generally thought to be captured by objective conditions regarding social problems such as poverty and malnutrition not only by the way mass media relate to them but also by the way the issue itself affects the agenda setting process across nations (Green-Pedersen, Wilkerson, 2006). The attention to objective conditions and social problems ensures that in different countries, with different policy styles and organizational systems, similar trends may emerge in given policy sectors. The Comparative Agenda Project (Cap) reflects the interest in coding and comparing similar policy topics across countries. In the attention framework, special interest has been devoted to the role of media and special interest groups in exerting pressure on incremental change in order to reach punctuations.

The continued evolution of the theoretical framework answers the increasing need for validity in detecting spatial-temporal patterns of policy change. In its third phase, the PET becomes a theory for information processing in the policy making cycle. Policy change over time and space is operationalized as a result of policy information that enables policy-makers to face uncertainty and ambiguity and to filter the complex world around them. When uncertainty and ambiguity do dominate, there is an increased need to understand how the dynamics of information, actors, and institutions contribute to the pressure or friction within political systems and how policy entrepreneurs use the redundancy of information and process it. Policy change, in other words, is the result of individual and organizational cognitive limits, and of the strengths in prioritizing attention in order to avoid the risks deriving from instability. Information processing is better performed when access to a greater number of channels facilitates multitasking operations (Workman, Jones, & Joachim 2009) and allows actors to cope with problems of efficiency or effectiveness across political or economic systems. Within PET, information processing in policy-making is seen as “struggle between forces of balance and forces of destabilization governed by positive feedback processes” and mechanisms (Jones & Baumgartner, 2012:3). The limited ability of policymakers to efficiently respond to the oversupply of policy information suggests that the theory of punctuated equilibrium is actually a theory of disproportionate information processing. What happens in complex systems is that relevant information within the political or economic system is often ignored, resulting in an increasing incapacity to react and in the risk of instability (Jones and Baumgartner, 2005). The fourth and last phase of PET evolves towards the framework of diffusion across institutions (Shipan & Volden, 2008; 2012) and is applied not only to individuals countries but also to federal institutions. How do policies diffuse across countries? Literature borrowing from punctuated equilibrium has developed a model of how the diffusion process works across institutions, specifically examining how diffusion prompted by external

events follows different patterns than diffusion caused by internal imitation or learning (Boushey, 2012). Comparative studies demonstrate that focusing on elections and on single country policy styles could be misleading in terms of capturing converging temporal policy trends across time and space. (John and Bevan, 2012) The last evolutionary stage of PET advances the idea of a typology of punctuations, differentiating between large, highly salient punctuations and small, low salience punctuations that work across diverse levels of government and disparate political systems.

Studying a complex multilateral organization operating over a sufficiently long period of time at global or regional levels, such as a development bank, in this case the ADB, has allowed us to further the analysis of the non-political factors that influence policy change, to observe changes in attention patterns by policy makers and to isolate temporal trends in the organization's activity. Examining the temporal trends of ADB policy topics also allows validation of the PET approach in a different organizational and institutional environment.

The analysis and isolation of the temporal trends of ADB activity is a crucial aspect that requires instruments to operationalize and measure variables, such as the *development policy output*, across time and space. Long run evolution of policy outputs can provide a quantification of relevance and attention to a specific topic at a certain stage of the policy cycle or at a given change in the context, and it can provide information regarding the attention to ideas, the nature of the problem at stake, and the evolution of the policy content. Framing and reframing are mechanisms for agenda change by policy entrepreneurs, and we consider developmental banks to be among the actors that can play a significant role in reframing policy content and organization at the cross-country level.

To isolate policy change and trends in development policies, we considered ADB-granted projects at the end of their financing cycle which were subject to performance feedback evaluations.

In the attempt to account for large-scale development policy change related to a macro-regional system with its single country subsystems, we analyzed ADB output indicators using the PET analytical framework, arguing that output punctuation is an indicator of a reaction to cognitive friction. In accordance with the PET framework, we opted for a macro analysis and searched for punctuation changes in ADB development policies.

We were able to automatically detect the dynamics of punctuation and incremental changes, meant as "outgrowths of earlier trajectories" (Baumgartner and Jones, 2002) over time of a *spectrum* of development policies, considering the totality of target subsystems meant as countries and sectors concerned, responding to the necessity of balancing different needs and demands (Buthe, 2002).

Changes in ADB policy topics were expected to follow patterns reflecting the politics of attention, related in our case study not to the formulation agenda setting but rather to evaluation agenda setting and output. Evaluation can be considered to be an additional activity of information processing and organizational cognition by the ADB.

The development of the punctuation equilibrium theory (PET) reveals an attempt to test and measure policy change and stability through the basic approaches utilized to measure change and stability along the policy process. Our experimental approach to detecting change and stability over time and space in policy attention and financial resource allocation entailed the use of LDA as a research technique to study how a multilateral financial institution, the ADB, sustains the regional social and economic development for a long time facing both endogenous and exogenous cognitive frictions deriving from economic crisis and from internal positive and negative performance feedback feedbacks. In the present experiment, we first present a gentle introduction to text mining and LDA topic model, and we then identify the key policy topics analyzed over time, with a focus on those topics with relevant increasing or decreasing trends: namely “hot and cold policy topics” (Griffiths and Steyvers, 2004), a procedure which describes how another meta-variable (year) can be used to explore the corpus from a chronological point of view. In the conclusion, we discuss our empirical findings and theoretical implications.

3 Sources and methods: Topic modeling and policy topics

A system full of complex interactive subsystems requires both qualitative and quantitative methods to be fully understood (Mahoney, Goertz, 2006). Development policy is a complex process reflecting and requiring a mix of qualitative/ quantitative assessment. Every day, a large number of decisions and related texts are generated by different kinds of public and private organizations, including banks and governments, along the policy cycle. Consequently, huge collections of data and texts increase in number and size. Information overload makes it difficult to process the information in a policy-making system and to understand the temporal patterns and issue prioritizations hidden in the corpora (Jones and Baumgartner, 2012). In fact, information overload is one of the key challenges that political and economic institutions must overcome in the information age. The text mining (TM) can mitigate the problem of validating codes and summarizing information contained in relevant information resources, without incurring in research bias or error, and this approach is also able to automatically detect policy topic trends and prioritization of policy issues by organizations over time. This use of TM to extract information from a collection of texts in digital form is known as topic modeling. As the name suggests, it involves modeling the data

entities that are likely to be from the same topic (Ponweiser, 2012; Grimmer and Stewart, 2013; Blei, Lafferty, 2009). Topic modeling is essentially a collection of algorithms that are used to discover themes, i.e. topics, in unstructured and complex texts featuring a number of interlinked policy issues. The Latent Dirichlet Allocation (LDA) was one of the first topic modeling algorithms, namely a “generative probabilistic model of a corpus. The basic idea is that documents are represented as random mixtures over latent topics, where each topic is characterized by a distribution over words” (Blei et al., 2003, p. 996). Since a text document can deal with multiple topics, and the words that appear in that document reflect a set of possible topics, in “statistical natural language processing, one common way of modeling the contributions of different topics to a document is to treat each topic as a probability distribution over words, viewing a document as a probabilistic mixture of these topics” (Griffiths, Steyvers, 2004, p. 5228). Intuitively, in term of generative process of LDA, the model can be summarized as follows (Ponweiser, 2012, p. 15):

1. for each topic, decide what words are likely to be used.
2. for each document,
 - a) decide what proportions of topics should be in the document,
 - b) for each word,
 - i. choose a topic,
 - ii. given this topic, choose a likely word (generated in step 1).

To summarize, a document is conceived to be a mixture of topics, and the topics represent the latent variable relations between documents and the occurrences of words. The model allows the analysis of the various topics, some more hidden than others, throughout the corpus and links them to other documents which deal with similar topics. A topic is a set of words that appear in the documents examined, and a word is seen as drawn from one of those topics, meaning which topics a document is primary addressing (Tong, Zhang, 2016.) Then, a probabilistic distribution of topics is generated, and the result is the assignment of topics, characterized by a particular cluster of words, to the documents under evaluation. Finally, to explore the trends of topics over time, it is possible to estimate the evolution of topics. In this case, “the per-document topic distributions were aggregated by averaging over all documents from the same year” (Ponweiser, 2012, p. 27). Applying a linear trend analysis of topic distributions by year, we are able to identify “hot and cold topics” (Griffiths, Steyvers, 2004), i.e. topics with a significant increasing trend (hot) and with a significant decreasing trend (cold). For the purpose of the present study, the temporal variable is important in order to analyze the evolution of topics and to examine the content of the ADB projects evaluated, to the

extent that they have a direct relationship with the years which represent specific consequences in the selection of policy issues. For these reasons, we selected LDA topic analysis because this “method discovers a set of topics expressed by documents, providing quantitative measures that can be used to identify the content of those documents, track changes in content over time” (Griffiths, Steyvers, 2004, p. 5228). Bringing the discourse back to the present study, understanding the temporal dynamics is one of the goals of our analysis, and it was hoped that the model would provide quantitative measures of the prevalence of particular topics that would be useful for gaining insight into the dynamics of policy activity. With reference to the policy topics used, we underline that a topic is an indicator of policy activity, and its evolution over time may suggest the paradigm change in terms of ideas, strategy, sectors and financial instruments used by the ADB to support economic and social development in Asia (Shirota, Hashimoto, Tamaki, 2015).

a. Data retrieving, pre-processing and fitting the model

Drawing upon a database of reports which evaluate the projects funded by the ADB, as the data for the experiment we selected 1917 titles and descriptions of projects that reports referred to, and especially those financed from 1995 through 2015. The data we selected for the experiment features two main characteristics. The first, in order to analyze the content of funded projects and to ensure that projects were effectively in the implementation and evaluation cycle, we used projects that were already undergoing assessment. In this way, irrespective of the year of approval of the project, we had the opportunity to have a dynamic representation by following the policy topic trends that rely on the evaluation cycle (evaluation report, technical assistance performance, project completion report, validation of project/program). The second is the length of the documents to be analyzed, since as some experiments have demonstrated (Recuero, Araujo, 2012; Zhao et al., 2011), the restricted length of texts can prevent them from being employed to their full potential (Hong, Davison, 2010). For these reason, given that a better model can be trained by aggregating short texts, we decided to use both project titles and descriptions. Thus, 1917 documents (title and description for each project) were collected for our experiment (Fig. 1).

Fig. 1: Project evolution according to the evaluation cycle (N=1917)

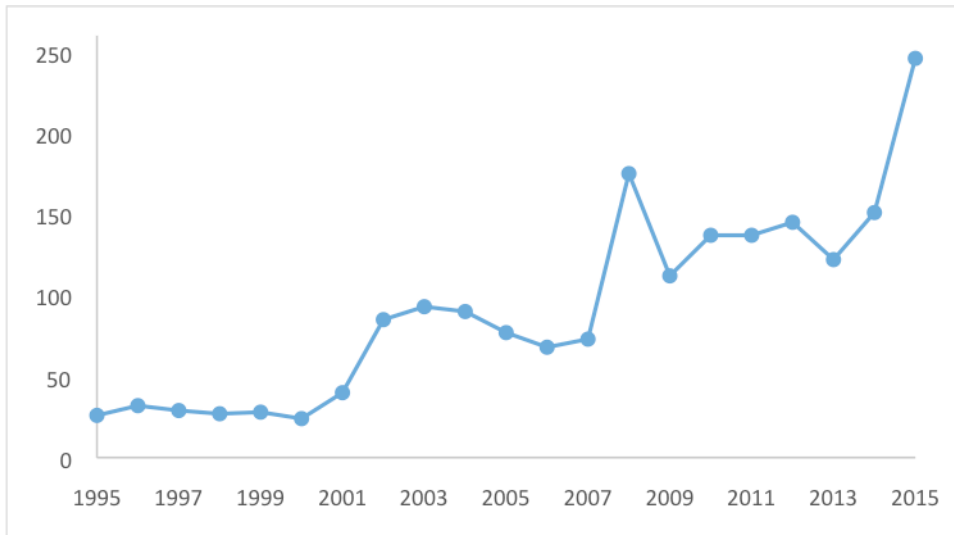


Figure 1 shows that a general increasing trend of activity (number of projects granted and evaluated) can be detected between 1995-2015, and moreover, that within this general trend two major punctuations are present: the first in 2008 and the second in 2014.

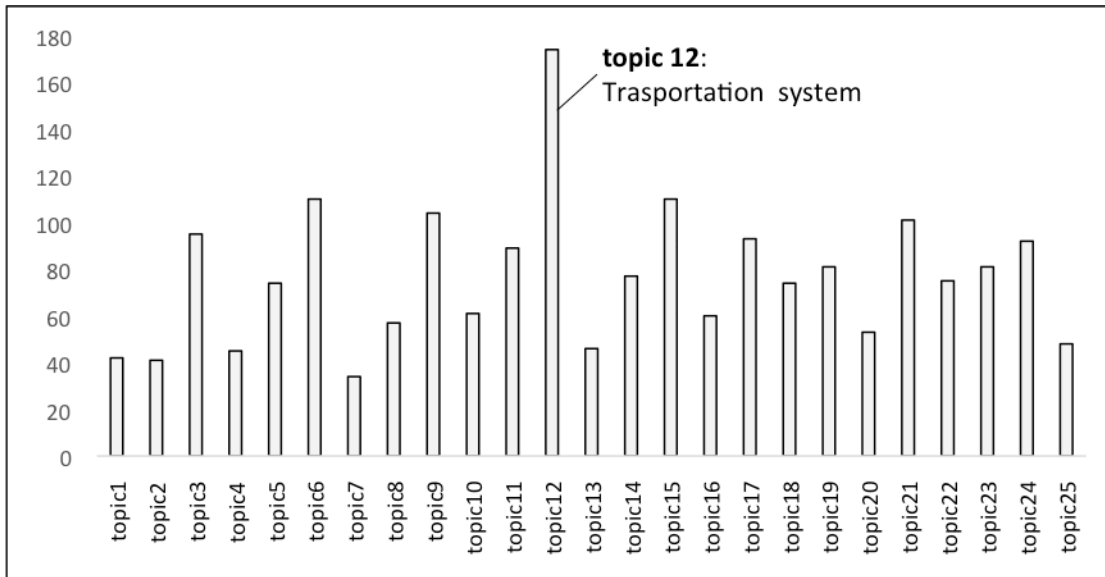
After identifying the quantitative punctuations, we went on to analyze the content of the policy topics encountered.

The corpus of abstracts and titles of the ADB projects examined were pre-processed using R¹ (R Development Core Team, 2014) to clean the text. The documents were stemmed (by removing the more common morphological and inflexional endings from words in English, for example capacity to capac, building to build), and stemmed multi-words were identified (n-grams constituted by sequences of words occurring repeatedly in the same order in the corpora). An automatic search procedure identified all multi-words repeated at least five times in the corpus and “only articles (a, an, the), prepositions (in, for, of, at, from...) and conjunctions (and, or, as, if, so...) were considered to be function words” (Tuzzi, 2012, p. 229). This procedure permitted the identification of the most interesting multi-word sequences in the stemmed documents (capac and build to capacxbuild, countri assist to countrixassist) and contributed to increasing the amount of information conveyed by sequences of words. Punctuation and numbers were removed (tokenization removed

¹ R is a popular language and environment for statistical computing available as free software under the terms of the Free Software Foundation’s GNU General Public License in source code form. The pre-processing phase were implemented by *tm* (text mining) package in R, and the topic model algorithms were implemented using *lda* and *topic model* packages in R language.

punctuations and as a results we obtained a list of tokens), and stop words (the, if, and...) were also removed because they were not significant and occurred frequently in the corpus. The pre-processing steps were useful both in reducing redundancy as well as simplifying LDA computation. Given that the LDA algorithm “fits” the terms in the document into the number of previously-specified topics, this could have been an important and sensitive variable affecting the findings, because too few topics would have produced broad topics mixing the contents, while too many topics would have produced small, difficult-to-interpret topics. Thus, to identify the ideal number of topics in a data-driven manner, we calculated different metrics (Arun *et al*, 2010) and we estimated the number of topics (Griffiths, Steyvers, 2004), using the maximum log-likelihood of LDA for topics from 2 to 50. The best number of topics is the one with the highest value, and the variation in log-likelihood suggests that 25 may be the optimal number of topics. The algorithm fit the number of topics quite well because the words in the same topic are associated, i.e. they refer to the same issue. The histograms show the distribution of number of documents for topics (Fig. 2).

Fig. 2: Policy topics distribution (25 topics, 1917 documents)



We can find the highest topic (nr. 12), referred to 170 projects, and its top term list (road, mainten, construct, bridg, highwai, expresswai, network, transport, peopl, access, improvxaccess, roadxsafeti, roadxmainten), clearly indicating that this topic is about transportation systems. The model processed documents into a set of our 25 topic proportions, i.e. the per-document topic distribution. Consequently, given one reference topic per document, the probability can be used to

extract most prevalent topic in an abstract and title. The highest topic probability proportions represent the main topics of each document. The example projects for the most prevalent topic, 12 (transportation systems), are the following:

- Viet Nam: GMS: Phnom Penh-HCMC Road Improvement²
- China, People's Republic of: Gansu Roads Development Project³
- China, People's Republic of: Eastern Sichuan Roads Development Project⁴

The algorithm fit the topics probability well, because the example projects in the same topic 12 refer to the same issues.

4- Results: Temporal patterns of policy topics (1995-2015)

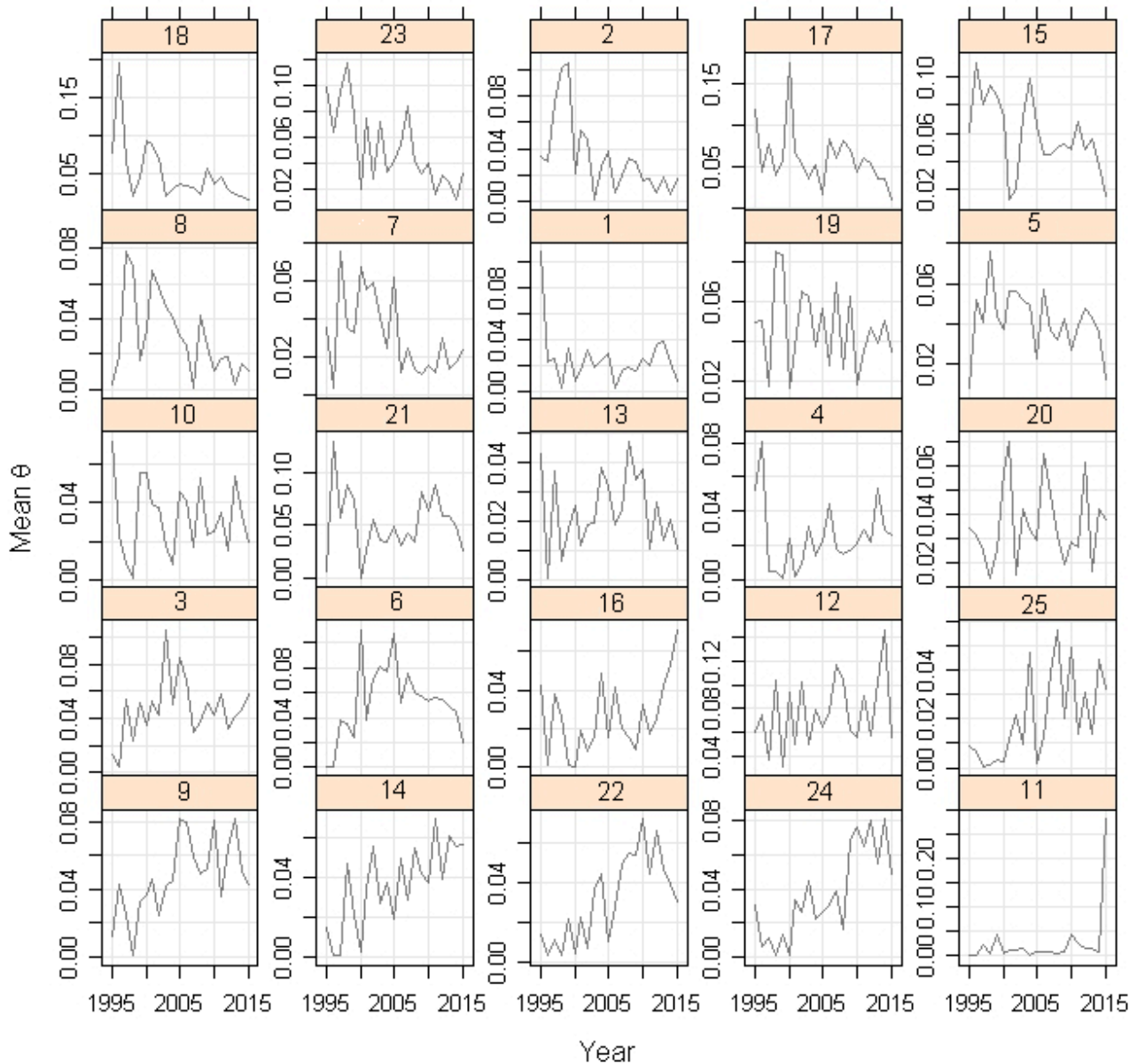
Starting from the 25 topics of the fitted model, we were then interested in the temporal dynamics of topics as policy activity. Thus we focused our analysis on the temporal evolution of ADB attention over time and on topic changes regarding developmental policies. While the precise direction of policy change is rarely taken into account, we defined change of a policy topic as a variation, increasing or decreasing, of the frequencies of issues included automatically in the topic itself, and concentrated on the extent to which policy change implied a decrease of attention given to an existing policy issue (Bauer, & Knill, 2014). Punctuation occurs when there is a major increase or decrease of a policy topic. In order to find topics that increased or fell during the period from 1995 to 2015, a linear trend analysis was conducted (Ponweiser, 2012; Griffiths, Steyvers, 2004). An idea of how the 25 topics changed over time is provided by Figure 3, featuring 25 panels, each with a different topic trend lines, illustrating the topics with positive or negative trends.

Fig. 3: Temporal patterns of the ADB 25 developmental policy topics (sorted by slope of linear models)

² Description link (project data sheet): <https://www.adb.org/projects/30316-013/main>

³ <http://www.adb.org/projects/33470-013/main>

⁴ <http://www.adb.org/projects/37490-013/main>



The topics are ordered by slope, consequently, decreasing topics appear in the first panels (top left), and those increasing are found in the last panels (bottom right). Consistent with the idea that ADB developmental policies show different trends, the analysis of time-dependent phenomena identifies three specific temporal patterns of topics that must be interpreted:

- a) topics whose trajectories have grown in time and are increasing over time⁵;
- b) topics whose trajectory decreased⁶;
- c) topics whose peak-like attention was high only in a specific interval of time (meteor), showing irregular temporal trajectories⁷.

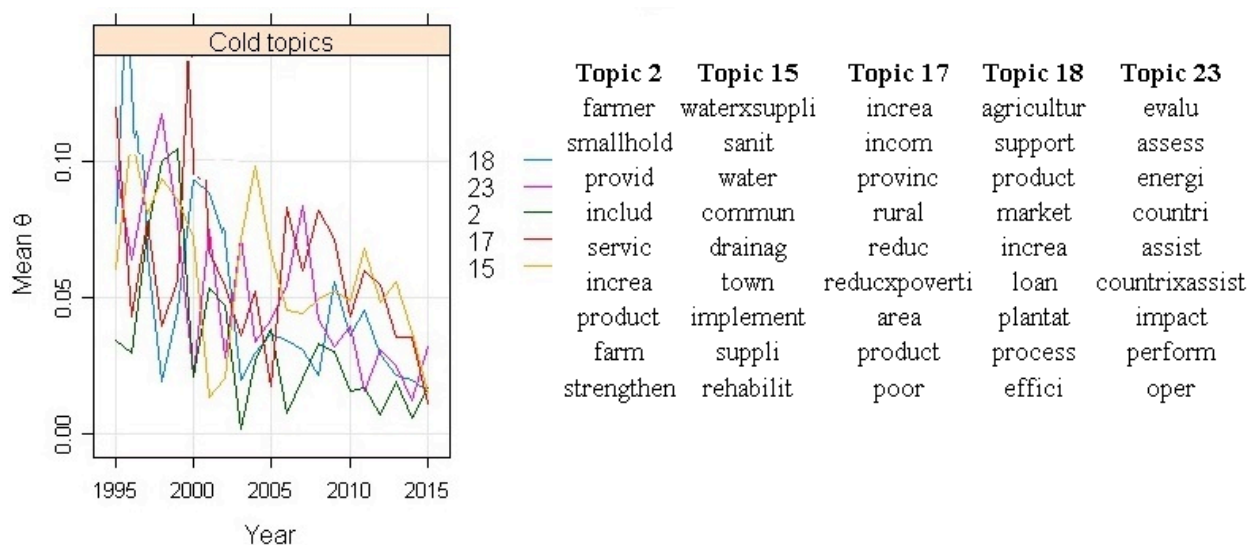
⁵ Topics 9, 14, 22, 24, 11, 16, 12, 25

⁶ Topics 15, 17, 2, 23, 18, 8, 7, 1

⁷ Topics 10, 21, 13, 4, 20, 3, 6, 5, 19

To focus our experiment on the main rising and falling policy topics, i.e. the topics that showed an increasing or decreasing trajectory, we analyzed the five coldest and hottest topics, providing the top term for these topics (Fig. 4).

Fig. 4: Decreasing topic attention; the five coldest



The coldest topics discovered through this analysis corresponded principally to agricultural and rural development in its many facets, from directly supporting agricultural activities, sanitation, and supporting a country’s capacity to manage projects and achieve effective results.

Agricultural development (topic 2) targeted smallholder farmers whose incomes were constrained by considerable yield losses. These yield losses were largely caused by pests, diseases, and poor farming practices, mainly due to the farmers’ lack of knowledge of improved crop and pest management practices. Since conventional strategies to enhance smallholder estate crop yields had been traditionally pesticide-driven, farmers needed alternative environmentally-sound options that would enable them to intensify their production. The project envisioned achieving this through the adoption of a cost-effective, environmentally-sound integrated pest management (IPM) approach.

Poverty reduction action (topic 17) supports rural infrastructure projects , as in the case of Indonesia's rural program in its eastern provinces. The project, part of the government's Fuel Subsidy Reduction Compensation Program (PKPS-BBM), rehabilitates and improves rural infrastructure in approximately 1,800 poor and often isolated villages in the provinces of East Java, Nusa Tenggara East, Southeast Sulawesi and South Sulawesi.

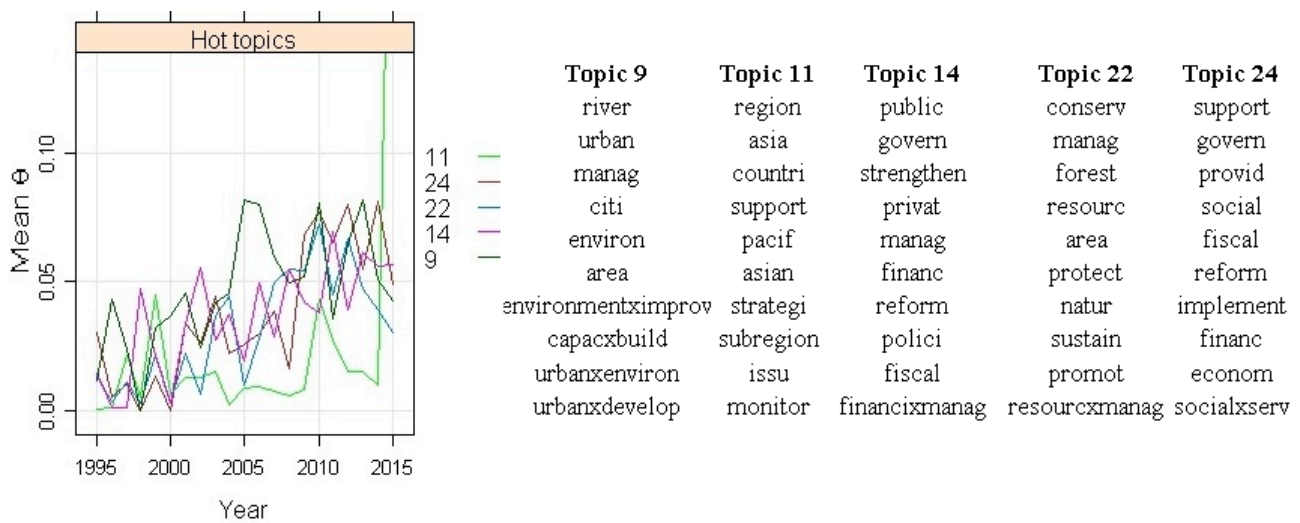
Water supply and sanitation facilities projects (topic 15), provide rural water supply and sanitation facilities and services to about 1,000 communities and a number of provinces of West Kalimantan, Central Kalimantan, Jambi and Bengkulu, combined with capacity building for districts and communities, and sanitation and hygiene behavioral change programs. The projects provide people with safe drinking water and improve sanitation facilities. The objective of the project is to enhance the health status of low-income communities in rural areas based on better hygiene behavior and to increase access to safe drinking water and improved sanitation.

Country assistance, in terms of performance management and social impact (topic 23), as in the case of Mongolia (2002), assisted the transition process when Mongolia joined the Asian Development Bank (ADB) as a member in 1991. The economic system in the country, at that time, was undergoing significant changes at the institutional, policy, economy, and financial levels. The government had taken preliminary steps toward reform, but assistance was required to stem the crisis, stabilize the economy, and complete the transition process. Financial support previously provided by the former Soviet Union had stopped, and technical advisors had been withdrawn. After a long period of complete isolation resulting in the near-collapse of the country's infrastructure, particularly the power and heating supply, the country required support during its transition to a market-oriented economy, while it sought to reform its systems and to manage daily crisis situations. External factors such as the Asian and Russian financial crisis and adverse weather conditions created further challenges to managing the transition process. Under these very difficult circumstances, the ADB supported the Mongolian transition process with loans.

These topics and programs were very popular through 2000, but decreased during the period considered. As we can see, these decreasing topics are highly interlinked: for example, *poverty reduction* (one of the ADB's leitmotifs) is associated with agricultural support, water sanitation and rural development.

Fig. 5: Increasing topic attention: the five hottest

We can summarize increasing attention as the transition to the primacy of urban over rural development.



The hottest topics are related to regional projects, specific to the Asia Pacific area, delivered to support regional and global economic cooperation. Governmental support and reform, private / public financial managing and reform, and finally environmental improvement and resource management are also increasing.

Policy support for regional and global economic cooperation (topic 11) has become a central issue after the Asian economic crisis in 1997. The ADB contributed to policy discussions under the G-20 process and other global as well as regional forums through the production of a series of policy notes. This knowledge product, to be called Policy Notes in Support of Regional and Global Economic Cooperation, increased Asia's perspectives on the issues in question as well as the ADB's experience and expertise. It was disseminated to ADB Management and served as an input to relevant ADB contributions to knowledge production. The ADB accumulated substantial experience and knowledge on many development issues of concern to the G-20 process. That knowledge transformed into supportive and tailored policies to the G-20 process and has helped the ADB to ensure that the Asian voice is reflected in G-20 policy.

Regional Economic Integration in Central Asia has been also pursued through technical assistance (TA) to capacity building of governmental institutions. It provides suggestions and enhances their abilities to deliver initiatives and programs in support of their respective mandates and explores policy options to strengthen institutions and identify capacity-building programs. This is also related to reform support (topic 24), which seeks to accelerate reforms that are essential for long-term economic growth while at the same time improving service delivery for social protection, such as the the Crisis Recovery Support Program (Tajikistan). This program provided a short-term fiscal stimulus to mitigate the economic and social impact of the financial crisis, and helped the country

meet critical public expenditure needs, such as social allowances, employment programs, and food and utility expenses of social institutions.

Private / public financial management and reforms (topic 14) includes small-scale capacity development technical assistance and was fairly extensive in the public as well as in the private enterprise sectors.

The improvement of financial management systems aims to support the achievement of sustained economic growth and fiscal stability as prioritized (Tuvalu and Maldives). The achievement of the expected outcome is reflected in the annual budget alignment with medium-term fiscal objectives, government transparency in monitoring its financial support to public enterprise, in public enterprise acting in compliance with all aspects of the public corporation and in the improvement of key financial indicators for public enterprise.

Environmental improvement and resource management issues (topics 9 and 22) have also gained increased attention in ADB project evaluation agenda. The projects were aimed at improving urban environmental conditions in countries such as Vietnam and China in the fields of private sanitation, drainage and flood protection, wastewater and public sanitation, waste management, assistance and institutional strengthening programs. The ADB has made efforts in recent years to improve the environmental conditions in the larger urban centers, while provincial towns have received much less attention, except for the improvement of water-supply systems. These projects have helped to improve the quality of life and the public health status of urban residents and to reduce pollution in streets, canals, waterways and lakes, reducing poverty in the six project towns and surrounding areas; they also promote balanced regional economic development and reduce migration from rural to urban regions.

Projects supporting the rich Asian biological diversity and increasing sustainability were also financed in order to preserve species-rich and endemic-rich ecosystems (China), which have deteriorated over the last five decades due to increasing of urban populations, grain production and water resource exploitation.

6. Discussion and conclusions.

Adopting a macro perspective to the analysis of change in development policy, we expected that, in accordance with the PET, different types of cognitive frictions within the ADB would produce a change in the prioritization of developmental policy agenda. The PET argues that punctuations

occur when strong external signals or accumulations of internal signals create frictions and policy change.

We found two kind of cognitive frictions fostering change within ADB developmental policies: the first is related to the accumulation of information deriving from internal evaluation processes and performance feedback, while the second is related to cognitive frictions as reactions to external relevant pressure generated by economic crisis and unexpected events such as natural disasters such as earthquakes, floods and tsunamis.

If we examine the temporal trend of ADB outputs (projects and programs) with respect to the four most relevant external shocks in the period considered (the 1997 Asian financial crisis; the 2004 tsunami; the 2005 earthquake in Pakistan and the 2009 financial crisis, which not only affected Asia but was felt globally) we cannot see a coincidence or correlation with the two punctuations that have emerged from the research, due to the fact that we considered projects which had been previously financed, concluded and evaluated. This however does not mean that external shocks had a limited impact on the volume of output in the field of developmental policies, but rather simply that the observable impact is delayed. The hypothesis that the increasing trends detected between 2000 and 2004, in 2007 and again in 2014 (Fig. 1) might be correlated to the evaluation of projects begun previously still requires further consideration. This study, however, leads us to believe that punctuations can be observed even more dynamically according to the kind of output considered at the different stages of the policy cycle.

Through the analysis of the issue content of the projects and programs, we observed a general shift from rural development to urban development and transportation. The research found three kind of topic trends and two distinct *directions of policy topic punctuation*, each of which was characterized by different policy issues that coexisted within the same organization in the period considered. To the hot-*increasing* and cold-*decreasing* policy topics we can add a third group, the “evergreen topics”. The research supplied further evidence concerning the fact that “disjoint policy responses, *in both increasing and decreasing directions*, are part and parcel of the same policy-making process that generate periods of stability” (Jones & Baumgartner, 2012:7).

The increasing and decreasing topics provide evidence for the coexistence of stability and change of development policy paradigms over time and space. This is particularly evidenced by the decline of traditional sectors, such as agriculture and energy, and the emergence of new issues, such as urban and environmental development.

Empirical results would seem to confirm the hypothesis that feedback on the performance of some lines funded by the ADB, especially in agriculture (Feeny, Vuong, 2017), have influenced the prioritization of development policies in this area. The cold topics, the importance of which has diminished in the ADB agenda, are currently evaluated as unsuccessful all around this policy field. Cold topics are indicators of a certain degree of policy dismantling in the agricultural sector. On the other side, hot policy topics are related to cross-sector policies and to infrastructure policies and are indicators of increasingly relevant sectors.

Looking at the temporal trends, we see two different dynamics: while in the decreasing topic (cold), specific policy sectors (such as agriculture) are emerging, in the increasing topics (hot) new cross-sector policy lines are emerging, such as support for regional and global economic cooperation, for the state reform and for private / public financial management. Environmental and natural resource management issues also saw increased attention and prioritization in the period considered. These two trends are due to different mechanisms of change with different dynamics that would have been difficult to detect without looking closely at the internal frictions and the replacement effects they produce.

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