Environment and Planning C: Government and Policy 2015, volume 33, pages 1233 – 1245

doi: 10.1177/0263774X15610059

The parameters of policy portfolios: verticality and horizontality in design spaces and their consequences for policy mix formulation

Michael Howlett
Burnaby Mountain Chair, Department of Political Science, Simon Fraser University, Burnaby, BC, Canada; Email: howlett@sfu.ca
Yong Pung How
Chair Professor Lee Kuan Yew School of Public Policy, National University of Singapore, Singapore; Email: howlett@sfu.ca
Pablo del Rio
Consejo Superior de Investigaciones Científicas (CSIC), Madrid, Spain;
Email: pablo.delrio@csic.es

Abstract. Policies increasingly come in complex packages and understanding the nature of design criteria for such portfolios is increasingly important. However, existing studies of policy mixes fail to carefully define the dependent variable of the inquiry. As a result, theorization of policy design has lagged, the cumulative impact of empirical studies has not been great and understanding of the phenomena, despite many observations of its significance in policy studies, has not improved significantly over the past three decades. This paper aims to revitalize this important aspect of policy design work and policy studies by distinguishing between mix types and their impact on policy formulation. It defines key types and subtypes of mixes based on the complexity of design variables such as the number of goals, the number of policies and the number of levels of government and sectors involved in the design of a policy bundle. The taxonomy is then used to assess the validity and applicability of oft-cited but under-examined portfolio design principles and precepts.

Keywords: policy design, policy instruments, policy tool choice, policy mixes, policy portfolios

Introduction: Tool mixes and policy design studies

Policy tools, or the instruments or techniques used by government in order to implement policy goals expected (Howlett, 2005), have a special place in considerations and studies of policy design. This is because this approach is based on the preparation of plans for tool use with a reasonable chance of achieving a specific goal or target (Howlett, 2004). Choosing policy tools becomes more complex when multiple goals and multiple policies are involved within the same sector and government, as is very common in many policy-making situations (Doremus, 2003; Howlett et al., 2009; Jordan et al., 2012).

These latter kinds of multi-policy, multi-goal and multi-instrument mixes – what Milkman et al. (2012) calls 'policy bundles', Chapman (2003) and Hennicke (2004) a 'policy mix' and Givoni et al. (2012) 'policy packages' – are examples of complex portfolios of tools. These mixes typically involve much more than functional logics linking tools to a goal but also deal with ideological or even 'aesthetic' preferences in tool choices and goal articulation. They often involve trade-offs and bargaining between actors in choosing one set of tools, goals and policies over another (Béland and Waddan, 2012; Williams and Balaz, 1999) which makes their formulation or design especially problematic (Bode I, 2006; Givoni, 2013; Givoni et al., 2012; Peters, 2005). This is even more difficult to do when instruments belong to different territorial/administrative levels.

Key design questions about such portfolios with which contemporary scholars and practitioners grapple include the issues of avoiding both 'over' and 'under' design (Haynes and Li, 1993; Maor, 2012); how to achieve 'complementarity' and avoid 'redundancy' or counterproductive mixes (Grabosky, 1995; Hou and Brewer, 2010; Justen et al., 2013a) – how to enhance or alter mixes over time so that they are able to continue to meet old goals and take on new ones (Kay, 2007; van der Heijden, 2011); and how to sequence or phase in instruments over time (Sorrell and Sijm, 2003; Taeihagh et al., 2013a; Ganghof, 2006). Each of these issues can be more complex, or simple, depending on the nature of the design context.

In what follows below several distinctions are drawn between mix types based on the complexity of design variables including the number of instruments, the number of policy goals, the number of sectors and the levels of government and sectors involved in the construction and maintenance of a portfolio. It is argued that if policy design theory is to improve and better inform policy practice, then it requires better understanding of the dimensions of these design spaces and the kinds of formulation processes which they involve (Howlett, 2011).

Problems with existing portfolio analyses

Although thinking about the design of policy portfolios has been at the forefront of much current research work on policy design (Braathen, 2007a, 2007b; Howlett, 2005, 2011; Howlett and Lejano, 2013), existing studies of such bundles of tools do not use consistent terminology and fail to define the dependent variable carefully enough (Howlett et al., 2006). As a result, the cumulative impact of empirical studies has not been great, theorization has lagged and understanding of the mix phenomena, despite many observations of its significance, has not improved very much over past decades (Chapman, 2003; Ring and Schroter-Schlaack, 2011).

Most older literature on policy tools focused on single instrument choices and designs (Salamon, 1989; Trebilcock and Prichard, 1983; Tupper and Doern, 1981) and these studies provide only limited insights into the complex arrangements of multiple policy instruments that are design commonly found in all policy fields (Givoni, 2013; Jordan et al., 2011, 2012). Many significant issues relate to the manner in which tool choices in bundles are made and how tool bundles evolve over time. These affect the propensity for designs to avoid the twin shoals of over and under-reacting to problems (Howlett and Rayner, 2007; Maor, 2012) while incorporating better knowledge of both synergistic and counterproductive tool relationships and interactions (Del Río, 2010; Grabosky, 1995; Justen et al., 2013b; LePlay; Thoyer, 2011; Fischer, 2010).

First there are a series of questions about how exactly tools fit together, or should fit together, into a mix. In such mixes, the instruments are not isolated from each other and tools in such mixes interact leading to the potential for negative conflicts ('one plus one is less than two') and synergies ('one plus one is more than two') (Lecuyer and Bibas, 2012; Philibert, 2011). In such cases, different design principles are required to help inform portfolio structure. Here the question of tool complementarity looms large. As Tinbergen (1952) noted, additional tools – 'supplementary' or 'complementary' ones – are often required to control side effects or otherwise bolster the use of a 'primary' tool. Bundling or mixing policy tools together in complex arrangements, however, raises many difficult questions for students and practitioners when there are significant interactive effects among policy tools (Boonekamp, 2006; Yi and Feiock, 2012), some of which may be very difficult to anticipate or quantify using standard analytical tools (Justen et al., 2013a, 2013b).

A second and related set of issues involves determining how many tools are required for the efficient attainment of a goal or goals. This concern has animated policy design studies from their outset and an example of an oft-cited rule in this area originating in the very early years of policy design studies is that the optimal ratio of the number of tools to targets or goals in any portfolio is 1:1 (Knudson, 2009).

This is a rule-of-thumb design principle towards which Tinbergen (1952) provided some logical justification in his discussion of the information and administrative costs associated with the use of redundant tools in the area of economic policy.[1] Most observers, however, dispute that such a simple situation was ever 'normal' and instead argue that combinations of tools are typically found in efforts to address multiple policy goals (Jordan et al., 2012).[2] The issue of potentially under or overdesigning a mix arises in all such circumstances and is made more complex because in some instances, for example, arrangements may be unnecessarily duplicative while in others some redundancy may be advantageous in ensuring that goals will be met (Braathen, 2007; Braathen and Croci, 2005).

A third set of concerns relates to how any optimum result can be attained in practice (Stead and Meijers, 2004; Stead et al., 2004; Stead and Meijers, 2009). This concern is less a spatial than a temporal issue as the existing evidence shows that suboptimal situations are very common in many existing mixes that have developed haphazardly through processes of policy layering (Thelen, 2004; van der Heijden, 2011). This is a process in which new tools and objectives have been piled on top of older ones, creating a palimpsest-like mixture of inconsistent and somewhat incoherent policy elements (Carter, 2012; Howlett and Rayner, 2007). These processes and change dynamics focus attention on the sequencing of instrument choices (Taeihagh et al., 2009, 2013b) and especially upon the fact that many existing mixes developed without any sense of an overall conscious design. These kinds of 'unintentional' mixes can be contrasted with 'smarter' designs, which involve creating new sets of tools specifically intended to overcome or avoid the problems associated with layering but which may be harder to put into practice (Gunningham et al., 1998; Kiss et al., 2012).

In other words, intelligent design of policy mixes begins with ensuring a good fit not only between packages of tools and government goals and their institutional and behavioural contexts at a specific moment in time (Considine, 2012; Lejano and Shankar, 2013) but also across time periods as new instruments appear and old ones evolve or are eliminated.[3] That is, design analyses must extend beyond questions of tool synergies and optimal design to consideration of how and why mixes change over time and how the processes of policy formulation followed in adopting such complex designs take place (Feindt and Flynn, 2009; Kay, 2007; Larsen et al., 2006).

Better defining the design space: Vertical and horizontal levels of complexity in policy portfolios

Most work on the subject of policy portfolio design fails to define the design space carefully enough to be able to distinguish the impact on different design choices of the spatial and temporal factors influencing the portfolio design process. Most studies, for example, fail to differentiate between simple and complex contexts and simple and complex designs and mixes (Howlett, 2004; Howlett et al., 2006). But, as the discussion of the Tinbergen Rule above illustrated, incorporating the level of complexity of a mix is an important characteristic

(1) This axiom was first put forward by Jan Tinbergen in 1952 (Tinbergen, 1952) and is sometimes referred to as the 'Tinbergen Rule' of policy design.

(2) Tinbergen analyzed what he termed the 'normal' case in which it was possible to match one goal with one target so that one instrument could fully address its task and accomplish the goal set out for it. As Tinbergen (1952: 37) himself argued, however, '*a priori* there is no guarantee that the number of targets always equals the number of instruments' and (p. 71) 'it goes without saying that complicated systems of economic policy (for example) will almost invariably be a mixture of instruments'.

(3) The former subject saw some earlier treatment in studies on 'policy styles', which identified common patterns and motifs in the construction of typical policy designs in different jurisdictions reflecting these concerns (Howlett, 2004; Richardson et al., 1982) and contemporary studies have taken this work to heart in locating design decisions within governance arrangements and existing policy regime preferences (Howlett, 2009).

of the problem context, which principles of portfolio design must take into account. Providing a better model of policy design spaces helps reveal some important variations in terms of who makes or is capable of making design decisions, as well as upon the likely content of that decision in specific contexts (Howlett, 2011).

In addressing the issue of design spaces and their impact on policy designs and designing a first-order distinction must be drawn between single 'level' mixes and those with a more complex structure. That is, in addition to the 'horizontal' issue addressed by many students of policy mixes – pertaining to the kind of relationships existing between tools, goals and policies within a single level of government and sector of policy making – a second, 'vertical' dimension is present and often ignored in these studies. This vertical dimension involves not just the number of instruments, goals and policies found in a mix, but also the number of policy sectors they involve and the number of governments active in policy formulation in this area (Del Río, 2009).

Such a framework allows room for many more complex interactions between bundle elements than typically envisioned or analyzed in existing studies. That is, conflicts and synergies between tools, goals and policies can be identified both at the horizontal level, for example between different types of instruments and goals within each level of analysis, and/or at the vertical, that is, across and between different policy sectors and/or administrative levels. These variations have significant implications for both the number and type of actors involved in policy design and the processes through which formulation unfolds, as well as for the complexity of design itself. While some aspects of horizontal interactions can be addressed in largely technical ways – so that, for example, some conflicts can be mitigated just by selecting certain instruments over others – in more complex cases such analyses must be supplemented by other political, administrative and organizational logics and policy formulation processes become more difficult. These challenges are multiplied as mixes evolve over time.

That is, vertical design contexts cutting across sectors and governments require efforts aimed at achieving administrative coordination and policy integration suitable to the complexity of a context, which horizontal mixes generally do not. In the former situation relevant coordination, for example, needs to be in place between different administrative levels and across policy subsystems, which are not needed in simpler horizontal contexts. The configuration of elements in a vertical mix must relate to preferences for different instruments favored in multiple sectors and governments rather than just among a single set of actors (Freeman, 1985; Howlett, 2009). And shifts in these preferences over time require changes to existing mixes, which may be more or less easy to achieve and require special handling or developmental techniques and analysis in more complex environments.

Developing a basic taxonomy of policy mixes

Developing a typology of policy mixes based on the level of complexity of design spaces is a useful first step in advancing design studies beyond their current weak status. Mixes can be assessed at a general level by identifying spaces of conflicts, complementarities and synergies between policy fields, but those interactions also depend on the type of tools being adopted and the specific design elements of the instruments adopted within each policy fields. The choice of specific instruments and design elements within interacting policy fields may contribute to mitigate conflicts and promote complementarities and synergies or not. Coordination is easier under certain instruments and design elements than under others.

The first key dimension in constructing such a taxonomy relates to distinguishing between mixes according to the number of instruments, goals and policies found within the horizontal level. Additional scenarios then exist for vertical mixes in situations in which multiple instruments and goals exist across sectors and governments. Like at the horizontal

level, at these other levels, tools and goals may complement each other, while in others or in some aspects they might not (Flanagan et al., 2011; Hull, 2008).

While relatively simple mix design processes may be dominated by expert actors (Dunlop, 2009) and decided upon according to technical or functional criteria (Braathen, 2007) moving towards multiple goals brings in additional actors such as those arrayed in 'epistemic communities' (Marier, 2008) and involves more sophisticated evidence and ideas than is found in more simple contexts (Sanderson, 2002). In such multilevel government and governance contexts (Hooghe and Marks, 2003), different levels of government are likely to have some common, but also different goals and instrument preferences (Enderlein et al., 2011) and reconciling them typically involves the use of the overt political calculus of intra- or intergovernmental bargaining and decision making (Bolleyer and Borzel, 2010; Kaiser et al., 2012).

Increasing the level of complexity from horizontal to vertical brings in cross-sectoral or cross-national epistemic actors (Haas, 1992), including political ones, and often involves the assessment and use of politically contested evidence and criteria (Gilabert and Lawford-Smith, 2012). The most sophisticated design spaces involve the most complex design processes and the full range of subsystem actors operating across multiple governance levels (Hooghe and Marks, 2003; McCool, 1998). Here, in the context of vested interests, lobbying pressures and intergovernmental jurisdictional disputes, fully-blown political criteria such as blame-avoidance, credit claiming, bargaining and log-rolling relevant information (Hood, 2010) are features of policy formulation and designs take on new forms and patterns.

Taking these five aspects of horizontality and verticality into account, and assuming simple binary measures of complexity at each level, yields 32 possible configurations of portfolios.[4] This complexity can be greatly reduced, however by restricting analysis to only complex tool mixes; that is, eliminating from further analysis half the circumstances whereby only a single instrument is utilized. Combining both cross-sectoral and multi-governmental vertical elements into a single multilevel variable then reduces this to eight basic types (see Table 1).

In this model, mixes can be seen to range from the simplest type when multiple tools are an issue (Type I) to the most complex multilevel, multi-policy, multi-goal type (Type VIII). Four of these eight types, are '*instrument mixes*' which involve single policy contexts (Types I, II, V and VI) and therefore are less complex than their multi-policy counterparts (Types III, VII and VIII), which can be termed '*policy mixes*'.

Table 1. Basic typology of portfolio designs.

	Types							
Dimension	I	II	III	IV	V	VI	VII	VIII
Multilevel	No	No	No	No	Yes	Yes	Yes	Yes
Multi-policy	No	No	Yes	Yes	No	No	Yes	Yes
Multi-goal	No	Yes	No	Yes	No	Yes	No	Yes
	Simple Single-level Instrument Mix	Complex Single-level Instrument Mix	Simple Single-level Policy mix	Complex Single-level Policy mix	Simple Multilevel Instrument Mix	Complex Multilevel Instrument Mix	Simple Multilevel Policy mix	Complex Multilevel Policy mix

(4) In order to focus our research to the most relevant types, for the moment we restrict the analysis to interactions which are implemented simultaneously, not sequentially.

Are all these eight types equally likely to occur? Although much of the literature seems to suggest that Type I situations are the norm, empirical studies suggest this is not the case (Hosseus and Pal, 1997; Howlett et al., 2006) and that more complex design spaces and hence policy portfolios are commonplace and growing. Factors such as the administrative and legislative arrangements present in federal and non-federal systems affect the likelihood of appearance of multi-governmental mixes (Bolleyer and Borzel, 2010; Howlett, 1999), while increasing efforts to promote collaborative or horizontal governance arrangements, for example, will affect the number of multisectoral and multi-policy situations which exist (Koppenjan et al., 2009; Peters, 1998).

Design implications flowing from this taxonomy

This model of mix types and design spaces helps overcome the three sets of issues raised above: how to avoid both 'over' and 'under' design; how to achieve 'complementarity' and avoid 'redundancy' or counterproductive mixes and how to enhance or alter mixes over time so that they are able to continue to meet old goals and take on new ones. Each of these issues is discussed in turn below.

Avoiding over and under-designing

Prima facie, the taxonomy set out in Table 1 shows that simple Tinbergen-type single instrument, single-goal, single policy, single government instrument mixes represents only one of many possible types of instrument mixes. And this means that the standard Tinbergen design maxim of 'one goal – one tool' proposed as a suitable rule to address the issue of instrument optimality is unlikely to be put into practice very often. Other principles need to be developed to take its place within more complex designs if over and under-designing is to be avoided. These, to a certain extent, now have come to relate to the need to promote ynergies and avoid counterproductive tools uses which previously was divorced from considerations of optimality by the assumption of simpler design spaces and rules.

Avoiding conflicts and promoting complementarities and synergies in tool uses

When multiple tools are involved in a mix, the tools involved and invoked may be inherently contradictory (Grabosky, 1995; Gunningham et al., 1998; Tinbergen, 1952) in the sense that they evoke contradictory responses from policy targets (Schneider and Ingram, 1990a, 1990b, 1993, 1994, 1997, 2005), while other combinations may be more virtuous in providing a reinforcing or supplementing arrangement (Hou and Brewer, 2010). Although a consensus does not exist on the terms and definitions of conflicts, complementarities and synergies (Oikonomou and Jepma, 2007; Oikonomou et al., 2010, 2011), nevertheless it can be argued that the types of interaction found between tools will vary such that in some cases there will be:

(1) a strong conflict: where the addition of an instrument (X) leads to a reduction of the effect of a second instrument (Y) in the combination: $0 < X + Y < 1$;
(2) a weak conflict (partial complementarity) where the addition of an instrument to another leads to a positive effect on the combination, but lower than the one that would take place if both were used separately: $1 < X + Y < 2$;
(3) a situation of full complementarity where X adds fully to the effect of Y in the combination: $X + Y = 2$ and
(4) a situation of synergy where adding X to Y magnifies the impact of the combination: $X + Y > 2$ (del Río, 2014).

Effective design would involve avoiding strong conflicts, minimizing weak ones and promoting complementarity and synergies.[5]

[5]Such interactions can range from 'no effect' to 'direct interaction' with effects ranging from 'duplication' (positive or negative redundancy) to 'extended coverage' (positive redundancy). See Del Río González (2007: 1368–1369).

Here the idea would be to attempt to avoid conflicts of both types while promoting tool combinations which are complementary or synergistic. While this becomes more difficult to do as the level of complexity of the design space increases, it remains a central goal of portfolio design. It may be impossible to satisfy all assessment criteria with different instruments when more than one goal, policy or government is involved. The best way to address trade-offs and conflicts between criteria is to adopt a multicriteria framework that makes those conflicts explicit. This allows policy makers to give weights to those criteria and decide on the trade-off according to their preferences.

Linking tools and goals is a second area in which synergies and complementarities can be sought. Criteria such as 'consistency', 'coherence', 'congruence' and level of 'integration' have been suggested as useful in this area of portfolio design (Howlett and Rayner, 2007; Kern and Howlett, 2009; Lanzalaco, 2011; Mandell, 2008). Work on mixes in sectors such as climate change mitigation and renewable energy support (Boonekamp, 2006; Del Río, 2009, 2010; Del Río et al., 2011; Del Río González, 2007) lead the way in this regard.

As Del Río (2009) has argued, design principles to promote integration in complex mixes require a broader view of the elements found in them than is typically examined in the literature on the subject (da Costa Canoquena, 2013). That is, appropriate policy evaluation, appraisal and design cannot be conducted in a narrow context. The focus should not be on the functioning of specific instruments with respect to one specific criterion, but rather upon the functioning of the whole policy mix and the conflicts and synergies with respect to several goals and criteria in this portfolio. This is a particular challenge with overlapping policies and governments. What might be regarded as conflictive in the interactions within an instrument mix might not be so problematic when a broader picture of a policy or governmental mix is considered. But both horizontal and vertical coordination are very difficult to achieve. There is certainly a role for coordination between goals and instruments to mitigate conflicts and to promote complementarities and synergies in policy mixes. But the existence of different goals at different administrative levels complicates vertical coordination. Different benefits and costs for different constituencies stemming from supranational policies may lead to low levels of social acceptability and considerations of political feasibility. Different goals may create winners and losers at lower administrative levels and, thus, lead to unacceptable distributional effects. All of these factors must enter into design considerations.

Promoting patching as well as packing in portfolio design

Finally, there is the issue of temporality and how to handle it. Considerations on how to overcome temporal legacies in existing portfolios range from thinking about designing in a situation which Thelen (2003) describes as 'replacement' – that is, one in which design occurs *de novo* and all previous regime elements have been swept away or do not exist – and in situations characterized by 'layering' – in which design occurs within the context of difficult to remove policy elements (Rayner et al., 2013).

That is, at least two distinct design techniques emerge here as formulation efforts may take the form of policy 'packaging', that is the creation of new mixes, or 'patching' in which only selected aspects of existing mixes are altered. Recognizing the drawbacks of layering, as often promoting unintentional mixes, many critics have increasingly argued for the promotion of complex policy mixes through replacement. However multiple policy tool portfolios that have evolved over a long period time through processes of incremental layering cannot easily be replaced. Policy 'patching' is a more realistic design modality in such contexts and, if done properly, with a clear eye on promoting coherence and integration in complex environments, can achieve complex and ambitious policy goals in as efficient and effective a way as those designs that are consciously created as interlocking packages of measures (Feindt and Flynn, 2009; Howlett and Rayner, 2013; Kay, 2007).

Conclusion

The multidimensional nature of policy mixes is a phenomena that has been ignored in most of the policy instrument choice and policy design literature, resulting in a lack of clarity and difficulties associating different kinds of actors and evaluation criteria with them (Leutz, 1999; Justen et al., 2013a, 2013b). It has also contributed to the continual use of outdated or inappropriate design maxims in their construction, which significantly enhance the potential for over and under-designing. Even with only three main portfolio dimensions – goals, policies and levels – the design situation is more complex and nuanced than is normally depicted in the existing policy design literature.

The aim of this article has been to develop the main elements of a theoretical and methodological taxonomy which can help to clarify the different types of policy portfolios that are currently often ignored or improperly juxtaposed in the existing literature on the subject. This was done in an effort to provide the basis not only for better designs but also for improved considerations of the formulation processes and of the roles of actors involved in such complex policy-making efforts. The discussion thus contributes to efforts currently being made to assess the success or optimality of complex policy mixes (Del Río, 2014; Howlett and Rayner, 2013; Mandell, 2008) and advances the project of revitalizing policy design studies urged by Howlett and Lejano (2013).

The paper argues that complex policy mixes inherently involve interactions between the different instruments of which they are composed, either in the form of conflicts or synergies. These can be defined as horizontal – between different types of instruments, policies or governments – and vertical – between different levels of goals, policies and levels of government. These two dimensions each contain a number of elements and a large number of possible permutations. However it is possible to refine significant mix types and design spaces to eight basic types: four relatively simple instrument mixes and four more complex policy mixes.

Mitigating the conflicts and encouraging synergies within these mixes through effective policy design first requires recognizing these different design spaces and their implications for what is being designed and by whom (Howlett, 2013). Only then can efforts take place to enhance relevant horizontal and vertical coordination between and within different administrative levels and sectors relating to different instruments, goals and policies contained within a mix. The typology of outcomes set out in Table 1 above suggests an increasingly complex environment for policy formulation as the number of portfolio parameters increases, ranging from relatively simple single instrument mixes to the multilevel, multi-goal and multi-policy bundles of higher numbered types (Keast et al., 2007).

The potential for complementarity and coherency effects to be actualized increases in level of difficulty as more goals, policies and governments are involved in a ‘bundle’ or ‘portfolio’ and the number of actors and types of evidence used in designing correspondingly increases in complexity and variability (Escribano, 2013). Developing such a multidimensional typology of policy portfolios, however, is a needed step, helping to clarify several outstanding issues in portfolio design which eluded existing literature on the subject (Vimpani, 2005). The typology allows us to begin to generate a multilevel model of tool selection and design showings how the problems (conflicts) in horizontal interactions can be mitigated by design principles such as, for example, coordinating targets, instruments and/or design elements while also suggesting that in many instances designing through patching will produce superior results to design through packaging or replacement.

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding
The author(s) received no financial support for the research, authorship, and/or publication of this article.

References

Bernadett C G M, Lena N, 2013, "The role of policy instruments in supporting the development of mineral wool insulation in Germany, Sweden and the United Kingdom" *Journal of Cleaner Production Environmental Management for Sustainable Universities (EMSU) 2010 European Roundtable of Sustainable Consumption and Production (ERSCP) 2010* **48**(June) 187–199 DOI: 10.1016/j.jclepro.2012.12.016

Béland D, Waddan A, 2012, "The Obama presidency and health insurance reform: assessing continuity and change" *Social Policy and Society* **11**(03) 319–330

Bode I, 2006, "Disorganized welfare mixes: voluntary agencies and new governance regimes in Western Europe" *Journal of European Social Policy* **16**(4) 346–359

Bolleyer N, Borzel T A, 2010, "Non-hierarchical policy coordination in multilevel systems" *European Political Science Review* **2**(02) 157–185

Boonekamp P G M, 2006, "Actual interaction effects between policy measures for energy efficiency – a qualitative matrix method and quantitative simulation results for households" *Energy* **31**(14) 2848–2873

Braathen N A, 2007a, "Instrument mixes for environmental policy: how many stones should be used to kill a bird?" *International Review of Environmental and Resource Economics* **1**(2) 185–235

Braathen N A, 2007b, *Instrument Mixes Addressing Non-Point Sources of Water Pollution* (OECD, Paris)

Braathen N A, Croci E, 2005, "Environmental agreements used in combination with other policy instruments", in *The Handbook of Environmental Voluntary Agreements* Ed Edoardo C (Springer, Dodrecht) vol. 43, pp 335–364

Carter P, 2012, "Policy as palimpsest" *Policy & Politics* **40**(3) 423–443

Chapman R, 2003, "A policy mix for environmentally sustainable development – learning from the Dutch experience" *New Zealand Journal of Environmental Law* **7**(1) 29–51

Considine M, 2012, "Thinking outside the box? Applying design theory to public policy" *Politics & Policy* **40**(4) 704–724

da Costa Canoquena J M, 2013, "Reconceptualising policy integration in road safety management" *Transport Policy* **25** 61–80

Del Río González P, 2007, "The interaction between emissions trading and renewable electricity support schemes. An overview of the literature" *Mitigation and Adaptation Strategies for Global Change* **12**(8) 1363–1390

Del Río P, 2009, "Interactions between climate and energy policies: the case of Spain" *Climate Policy* **9**(2) 119–138

Del Río P, 2010, "Analysing the interactions between renewable energy promotion and energy efficiency support schemes: the impact of different instruments and design elements" *Energy Policy* **38**(9) 4978–4989

Del Río P, 2014, "On evaluating success in complex policy mixes: the case of renewable energy support schemes" *Policy Sciences* **47**(3) 1–21. DOI: 10.1007/s11077-013-9189-7

Del Río P, Silvosa A C, Gómez G I, 2011, "Policies and design elements for the repowering of wind farms: a qualitative analysis of different options" *Energy Policy* **39**(4) 1897–1908

Doremus H, 2003, "A policy portfolio approach to biodiversity protection on private lands" *Environmental Science & Policy* **6** 217–232

Dunlop C A, 2009, "Policy transfer as learning: capturing variation in what decision-makers learn from epistemic communities" *Policy Studies* **30**(3) 289–311

Enderlein H, Wälti S, Zürn M, 2011, *Handbook on Multi-Level Governance* (Edward Elgar Publishing, Cheltenham)

Escribano G, 2013, "Ecuador's energy policy mix: development versus conservation and nationalism with Chinese loans" *Energy Policy* **57** 152–159 DOI: 10.1016/j.enpol.2013.01.02

Feindt P H, Flynn A, 2009, "Policy stretching and institutional layering: British food policy between security, safety, quality, health and climate change" *British Politics* **4**(3) 386–414

Fischer C, 2010, "Combining policies for renewable energy: is the whole less than the sum of its parts?" *International Review of Environmental and Resource Economics* **4**(1) 51–92

Flanagan K, Uyarra E, Laranja M, 2011, "Reconceptualising the 'Policy Mix' for innovation" *Research Policy* **40**(5) 702–713

Freeman G P, 1985, "National styles and policy sectors: explaining structured variation" *Journal of Public Policy* **5**(4) 467–496

Ganghof S, 2006, "Tax mixes and the size of the welfare state: causal mechanisms and policy implications" *Journal of European Social Policy* **16**(4) 360–373

Gilabert P, Lawford-Smith H, 2012, "Political feasibility: a conceptual exploration" *Political Studies* **60**(4) 809–825. DOI: 10.1111/j.1467-9248.2011.00936.x

Givoni M, 2013, "Addressing transport policy challenges through policy-packaging" *Transportation Research Part A: Policy and Practice* **60**(February 2014) 1–8. DOI: 10.1016/j.tra.2013.10.012

Givoni M, Macmillen J, Banister D, Feitelson E, 2012, "From policy measures to policy packages" *Transport Reviews* **33**(1) 1–20. DOI: 10.1080/01441647.2012.744779

Grabosky P, 1995, "Counterproductive regulation" *International Journal of the Sociology of Law* **23** 347–369

Gunningham N, Grabosky P, Sinclair D, 1998, *Smart Regulation: Designing Environmental Policy* (Clarendon Press, Oxford)

Haas P M, 1992, "Introduction: epistemic communities and international policy coordination" *International Organization* **46**(1) 1–36

Haynes K E, Li Q, 1993, "Policy analysis and uncertainty: lessons from the IVHS transportation development process" *Computers, Environment and Urban Systems* **17**(1) 1–14

Hennicke P, 2004, "Scenarios for a robust policy mix: the final report of the German study commission on sustainable energy supply" *Energy Policy* **32**(15) 1673–1678

Hood C, 2010, *The Blame Game: Spin, Bureaucracy, and Self-Preservation in Government* (Princeton University Press, Princeton)

Hooghe L, Marks G, 2003, "Unraveling the central state, but how? Types of multi-level governance" *American Political Science Review* **97**(2) 233–243

Hosseus D, Pal L A, 1997, "Anatomy of a policy area: the case of shipping" *Canadian Public Policy* **23**(4) 399–416

Hou Y, Brewer G, 2010, "Substitution and supplementation between co-functional policy instruments: evidence from state budget stabilization practices" *Public Administration Review* **70**(6) 914–924

Howlett M, 1999, "Federalism and public policy", in *Canadian Politics – Third Edition* Eds J Bickerton, A Gagnon (Broadview Press, Peterborough) pp 523–539

Howlett M, 2004 "Beyond good and evil in policy implementation: instrument mixes, implementation styles and second generation theories of policy instrument choice" *Policy & Society* **23**(2) 1–17

Howlett M, 2005, "What is a policy instrument? Policy tools, policy mixes and policy implementation styles", in *Designing Government: From Instruments to Governance* Eds P Eliadis, M Hill, M Howlett (McGill-Queen's University Press, Montreal) pp 31–50

Howlett M, 2009, "Governance modes, policy regimes and operational plans: a multi-level nested model of policy instrument choice and policy design" *Policy Sciences* **42**(1) 73–89

Howlett M, 2011, *Designing Public Policies: Principles and Instruments* (Routledge, New York)

Howlett M, 2014, "Policy design: What, who, how and why?", in *L'instrumentation et Ses Effets* Eds Halpern C, Lascoumes P, Le G P (Presses de Sciences Po, Paris) pp 281–315

Howlett M, Kim J, Weaver P, 2006, "Assessing instrument mixes through program- and agency-level data: methodological issues in contemporary implementation research" *Review of Policy Research* **23**(1) 129–151

Howlett M, Raul L, 2013, "Tales from the Crypt: The rise and fall (and re-birth?) of policy design studies" *Administration & Society* **45**(3) 356–380

Howlett M, Ramesh M, Perl A, 2009, *Studying Public Policy: Policy Cycles & Policy Subsystems* (Oxford University Press, Toronto)

Howlett M, Rayner J, 2007, "Design principles for policy mixes: cohesion and coherence in 'New Governance Arrangements'" *Policy and Society* **26**(4) 1–18

Howlett M, Rayner J, 2013, "Patching vs packaging in policy formulation: assessing policy portfolio design" *Politics and Governance* **1**(2) 170–182. DOI: 10.12924/pag2013.01020170

Hull A, 2008, "Policy integration: what will it take to achieve more sustainable transport solutions in cities?" *Transport Policy* **15**(2) 94–103

Jordan A, Benson D, Wurzel R, Zito A, 2011, "Policy instruments in practice", in *Oxford Handbook of Climate Change and Society* Eds J S Dryzek, R B Norgaard, D Schlosberg (Oxford University Press, Oxford) pp 536–549

Jordan A, Benson D, Zito A, Wurzel R, 2012, "Environmental policy: Governing by multiple policy instruments?", in *Constructing a Policy State? Policy Dynamics in the EU* Ed Richardson JJ (Oxford University Press, Oxford) pp 104–124

Justen A, Nils F, Moshe G, James M, 2014, "A process for designing policy packaging: Ideals and realities" *Transportation Research Part A: Policy and Practice, Policy Packaging* **60**(February) 9–18 DOI: 10.1016/j.tra.2013.10.016

Justen A, Jens S, Barbara L, Torsten F, 2014, "Assessment of policies and detection of unintended effects: Guiding principles for the consideration of methods and tools in policy-packaging" *Transportation Research Part A: Policy and Practice, Policy Packaging* **60**(February) 19–30 DOI: 10.1016/j.tra.2013.10.015

Kaiser A, Kaiser A, Biela J, 2012, *Policy Making in Multilevel Systems: Federalism, Decentralisation, and Performance in the OECD Countries* (European Consortium for Political Research Press, Essex)

Kay A, 2007, "Tense layering and synthetic policy paradigms: the politics of health insurance in Australia" *Australian Journal of Political Science* **42**(4) 579–591

Keast R, Brown K, Mandell M, 2007, "Getting the right mix: unpacking integration meanings and strategies" *International Public Management Journal* **10**(1) 9–33

Kern F, Howlett M, 2009, "Implementing transition management as policy reforms: a case study of the Dutch energy sector" *Policy Sciences* **42**(4) 391–408

Kiss B, Manchón C G, Neij L, 2012, "The role of policy instruments in supporting the development of mineral wool insulation in Germany, Sweden and the United Kingdom" *Journal of Cleaner Production*, 29 December 2012

Knudson W A, 2009, "The environment, energy, and the Tinbergen rule" *Bulletin of Science, Technology & Society* **29**(4) 308–312

Koppenjan J, Kars M, van der Voort H, 2009, "Vertical politics in horizontal policy networks: framework settings as coupling arrangement" *Policy Studies Journal* **37**(4) 769–792

Lanzalaco L, 2011, "Bringing the Olympic rationality back in? Coherence, integration and effectiveness of public policies" *World Political Science Review* **7**(1) 1098

Larsen T P, Taylor-Gooby P, Kananen J, 2006, "New labour's policy style: a mix of policy approaches" *International Social Policy* **35**(4) 629–649

Lecuyer O, Bibas R, 2012, *Combining Climate and Energy Policies: Synergies or Antagonism? Modeling Interactions with Energy Efficiency Instruments*. SSRN Scholarly Paper (Social Science Research Network, Rochester, NY), http://papers.ssrn.com/abstract=1992324 Accessed 15 July 2013

Lejano R P, Shankar S, 2013, "The contextualist turn and schematics of institutional fit: theory and a case study from Southern India" *Policy Sciences* **46**(1) 83–102

Leplay S, Thoyer S, 2011, *Synergy Effects of International Policy Instruments to Reduce Deforestation: A Cross-country Panel Data Analysis*. Working Paper (LAMETA, University of Montpellier), http://ideas.repec.org/p/lam/wpaper/11-01.html

Leutz W N, 1999, "Five laws for integrating medical and social services: lessons from the United States and the United Kingdom" *The Milbank Quarterly* **77**(1) 77–110

Mandell S, 2008, "Optimal mix of emissions taxes and cap-and-trade" *Journal of Environmental Economics and Management* **56** 131–140

Marier P, 2008, "Empowering epistemic communities: specialized politicians, policy experts and policy reform" *West European Politics* **31**(3) 513–533

Maor M, 2012, "Policy overreaction" *Journal of Public Policy* **32**(03) 231–259
McCool D, 1998, "The subsystem family of concepts: a critique and a proposal" *Political Research Quarterly* **51**(2) 551–570
Meijers E, Stead D, 2004, "Policy integration: what does it mean and how can it be achieved? A multi-disciplinary review", 2004 Berlin Conference on the human dimensions of global environmental change: greening of policies – interlinkages and policy integration, Berlin, pp 1–15
Meijers E, Stead D, Geerlings H, 2004, "Policy integration: A literature review", in *Policy Integration in Practice: The Integration of Land Use Planning, Transport and Environmental Policy-Making in Denmark, England and Germany* Eds Evert M, Geerlings H, Dominic S (Delft university Press, Delft) pp 9–24
Milkman K L, Mazza M C, Shu L L, Chia-Jung T, Bazerman M H, 2012, "Policy bundling to overcome loss aversion: a method for improving legislative outcomes" *Organizational Behavior and Human Decision Processes* **117**(1) 158–167
Oikonomou V, Flamos A, Grafakos S, 2010, "Is blending of energy and climate policy instruments always desirable?" *Energy Policy* **38**(8) 4186–4195
Oikonomou V, Flamos A, Zeugolis D, Grafakos S, 2011, "A qualitative assessment of EU energy policy interactions" *Energy Sources, Part B: Economics, Planning, and Policy* **7**(2) 177–187
Oikonomou V, Jepma C J, 2007, "A framework on interactions of climate and energy policy instruments" *Mitigation and Adaptation Strategies for Global Change* **13**(2) 131–156
Peters B G, 1998, *Managing Horizontal Government: The Politics of Coordination* (Canadian Centre for Management Development, Ottawa)
Peters B G, 2005, "Conclusion: the future of instruments research", in *Designing Government: From Instruments to Governance* Eds P Eliadis, M Hill, M Howlett (McGill-Queen's University Press, Montreal) pp 353–363
Philibert C, 2011, *Interactions of Policies for Renewable Energy and Climate*. IEA Energy Paper (OECD Publishing), March, http://econpapers.repec.org/paper/oecieaaaa/2011_2f6-en.htm Accessed 15 July 2013
Rayner J, McNutt K, Wellstead A, 2013, "Dispersed capacity and weak coordination: the challenge of climate change adaptation in Canada's Forest Policy Sector" *Review of Policy Research* **30**(1) 66–90. DOI: 10.1111/ropr.12003
Richardson J, Gustafsson G, Jordan G, 1982, "The concept of policy style", in *Policy Styles in Western Europe* Ed J J Richardson (George Allen and Unwin, London) pp 1–16
Ring I, Schroter-Schlaack C, 2011, *Instrument Mixes for Biodiversity Policies* (Helmholtz Centre for Environmental Research, Leipzig)
Salamon L M, 1989, "The tools approach: basic analytics", in *Beyond Privatization: The Tools of Government Action* Eds L S Salamon, M S Lund (Urban Institute, Washington, DC) pp 23–50
Sanderson I, 2002, "Evaluation, policy learning and evidence-based policy making" *Public Administration* **80**(1) 1–22
Schneider A, Ingram H, 1993, "Social construction of target populations: implications for politics and policy" *American Political Science Review* **87**(2) 334–347
Schneider A, Ingram H, 1994, "Social constructions and policy design: implications for public administration" *Research in Public Administration* **3** 137–173
Schneider A, Ingram H, 1997, *Policy Design for Democracy* (University Press of Kansas, Lawrence)
Schneider A, Ingram H, 2005, *Deserving and Entitled: Social Constructions and Public Policy*. SUNY Series in Public Policy (State University of New York, Albany)
Schneider A L, Ingram H, 1990a, "Behavioural assumptions of policy tools" *Journal of Politics* **52**(2) 511–529
Schneider A L, Ingram H, 1990b, "Policy design: elements, premises and strategies", in *Policy Theory and Policy Evaluation: Concepts, Knowledge, Causes and Norms* Ed S S Nagel (Greenwood, New York) pp 77–102
Sorrell S, Sijm J, 2003, "Carbon trading in the policy mix" *Oxford Review of Economic Policy* **19**(3) 420–437

Stead D, Geerlings H, Meijers E, 2004, *Policy Integration in Practice: The Integration of Land Use Planning, Transport and Environmental Policy-Making in Denmark, England and Germany* (Delft University Press, Delft)

Stead D, Meijers E, 2004, "Policy integration in practice: some experiences of integrating transport, land-use planning and environmental politics in local government", 2004 Berlin Conference on the human dimensions of global environmental change: greening of policies – interlinkages and policy integration, Berlin, pp 1–13

Stead D, Meijers E, 2009, "Spatial planning and policy integration: concepts, facilitators and inhibitors" *Planning Theory & Practice* **10**(3) 317–332

Stouten H, Aimé H, Xavier G, Hans P, 2011, "Policy instruments to meet fisheries management objectives in Belgian fisheries" *Fisheries Research* **111**(1–2) 8–23

Taeihagh A, René B-A, Moshe G, 2014, "A virtual environment for the formulation of policy packages" *Transportation Research Part A: Policy and Practice, Policy Packaging* **60**(February) 53–68 DOI: 10.1016/j.tra.2013.10.017

Taeihagh A, Bañares-Alcántara R, Wang Z, 2009, "A novel approach to policy design using process design principles", in *Computer Aided Chemical Engineering* Eds Oller do Nascimento CA, Biscaia EC and de Brito Alves RM, vol. 27 (Elsevier, London) pp 2049–2054

Taeihagh A, Givoni M, Bañares-Alcántara R, 2013a, "Which policy first? A network-centric approach for the analysis and ranking of policy measures" *Environment and Planning B: Planning and Design* **40**(4) 595–616. DOI: 10.1068/b38058

Thelen K, 2003, "How institutions evolve: insights from comparative historical analysis", in *Comparative Historical Analysis in the Social Sciences* Eds J Mahoney, D Rueschemeyer (Cambridge University Press, Cambridge) pp 208–240

Thelen K, 2004, *How Institutions Evolve: The Political Economy of Skills in Germany, Britain, the United States and Japan* (Cambridge University Press, Cambridge)

Tinbergen J, 1952, *On the Theory of Economic Policy* (North-Holland Pub. Co., Dordrecht)

Trebilcock M J, Prichard J R S, 1983, "Crown corporations: The calculus of instrument choice", in *Crown Corporations in Canada: The Calculus of Instrument Choice* Ed Prichard J R S (Butterworths, Toronto) pp 1–50

Tupper A, Doern G B, 1981, "Public corporations and public policy in Canada", in *Public Corporations and Public Policy in Canada* Eds Tupper A, Doern G B (Institute for Research on Public Policy, Montreal) pp 1–50

Van der Heijden J, 2011, "Institutional layering: a review of the use of the concept" *Politics* **31**(1) 9–18

Vimpani G, 2005, "Getting the mix right: family, community and social policy interventions to improve outcomes for young people at risk of substance misuse" *Drug and Alcohol Review* **24** 111–125

Williams A M, Balaz V, 1999, "Privatisation in central Europe: different legacies, methods and outcomes" *Environment and Planning C: Government and Policy* **17** 731–751

Yi H, Feiock R C, 2012, "Policy tool interactions and the adoption of state renewable portfolio standards" *Review of Policy Research* **29**(2) 193–206