

MEASURING POLICY INSTRUMENT INTERACTIONS IN POLICY MIXES

Surveying the Conceptual and Methodological Landscape

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Resolving a complex policy problem often requires a mix of policy instruments and thus the identification of the most promising instrument combination. However, the relevant terminology of instrument interactions in a policy mix has not been standardized, hindering a straightforward identification of superior instrument combinations. To address this challenge, the chapter defines the terminology necessary for detecting three different possible policy instrument interactions – namely, synergistic, counterproductive, and additive effects. It identifies two approaches to analyzing instrument mix effects: the “effect-based” and the “effort-based” methods. It then discusses the practical advantages and limitations of each approach and elaborates on key methodological issues that policy scholars and practitioners face at each step of developing a new policy mix.

Introduction

Individual policy instruments cannot solve complex policy problems. Most are beset by intrinsic limitations that restrict their maximum contribution to the realization of policy goals. This problem led policy scholars to study bundles or portfolios of policy instruments (e.g., Howlett and Rayner 2007; Capano and Howlett 2020; Feindt and Flynn 2009; Kay 2007; Larsen et al. 2006), and some have recently addressed the empirical analysis and conceptualization of policy mixes as systems of interconnected elements susceptible to simultaneous mutual or reciprocal interactions (del Río 2010; Lecuyer and Bibas 2012; Rosenow et al. 2016; Trencher and van der Heijden 2019; Attwell and Navin 2019). This chapter tries to delve deeper into what it means for policy instruments to interact.

Instrument interconnection or interactions occur in policy mixes when two or more policy tools are included in a combination that alters the way one or more of these instruments contribute to the realization of policy targets. These interactions can be multi-level (e.g., Howlett and del Río 2015; Goyal and Howlett 2021) and cross-sectoral (e.g., Mantino and Vanni 2019; Boonekamp 2006) and may result in expected and unexpected effects (e.g., feedback effects, side

effects) across a wide range of contexts, making their analysis and implementation challenging. Evaluating policy mix differences requires a clear understanding of the nature of each tool as well as the nature of its relationship(s) to others. Indeed, this constitutes a critical element of policy design (Howlett and Mukherjee 2018).

In order to ensure a design's success, the definitional and methodological grounds underlying the evidence gathered on these interactions must be solid so that a conclusion that one instrument mix is significantly superior to another is well founded. Unfortunately, current research features a variety of competing means and methods, as well as concepts and vocabulary developed to address these issues, and this confusion is hindering the clear exposition and understanding of the central problematic and its resolution. The overlaps and lacuna in the policy design field today are more pronounced than ever before because instrument combinations form the mainstay of current policy solutions for numerous complex policy problems, and synergistic instrument mixes are preferred in policy mixes for many policy problems. It is time to deepen our knowledge of synergistic, counterproductive, and other kinds of instrument interactions which are a feature of numerous policy mixes (e.g., del Río 2010; Fernández-i-Marín et al. 2021; Grabosky 1995; Justen et al. 2013; Leplay and Thoyer 2011; Trencher and van der Heijden 2019).

Towards this end, this chapter provides the minimal set of concepts necessary to understand and measure instrument-instrument interactions, distinguishing between three different kinds of instrument interactions and dividing the methodologies used to assess them into effect-based approaches and effort-based approaches. It thereafter discusses the respective advantages and limitations of these two approaches and elaborates on key methodological issues and challenges that policy scholars must face and overcome at each step in the analysis and design of instrument mixes.

Existing Concepts of Policy Tool Effects and Interactions

A few concepts have entered the policy lexicon to help discern the key effects of multiple instruments in a policy mix. The terms *synergy* and *counterproductive effects* are often used to justify choices concerning the number of instruments required for the efficient attainment of a policy goal or goals (Rogge et al. 2017; Trencher and van der Heijden 2019). Both figured prominently, for example, in a recent discussion around how to avoid potentially under- or over-designing a policy mix (Maor 2020).

del Río (2010), Rosenow et al. (2016), and Lecuyer and Bibas (2012), for example, have examined whether tool combinations are complementary, neutral, conflicting, or overlapping in the areas of environment and energy. Trencher and van der Heijden (2019) have used an adaptive theory approach to identify complementarity advancing measures. And Attwell and Navin (2019) have offered a framework that emphasizes differences in mixes related to scope (which vaccines to require), sanctions (which penalty to impose), severity (how much of the penalty to impose), and selectivity (how to enforce or exempt people from vaccine mandates). Synthesized information about how these elements interact at the level of individual action could be thereafter combined to a distinct attribute – saliency – which “identifies the magnitude of the burdens the state imposes on those who are not vaccinated” (Attwell and Navin 2019: 979).

“Synergies” reflect the situation in which individual instruments combine in unexpected, nonlinear ways to enhance overall instruments mix effectiveness while “counterproductive” effects are those in which instruments combine to detract from overall instruments mix effectiveness. Among these interactions, synergy is a highly pursued goal of instruments mix development. Counterproductive effects in policy settings are less so (Trencher and van der Heijden

2019). Although, as we will elaborate on later, these effects can, at times, be desirable with regard to policy effectiveness.

These terms describe critical elements of policy mixes – especially concerning “how well the elements of the policy mix are aligned with each [other], thereby contributing to the achievement of policy objectives” (Rogge and Reichardt 2016: 1626). Individual instruments in a policy mix can be considered consistent when they work together to support a policy strategy: “They are inconsistent when they work against each other and are counter-productive” (Kern and Howlett 2009: 396). Note, however, that inconsistency does not necessarily lead to counterproductive effect; it can also have neutral effects: that is, having no strongly marked or positive effects.

In total, there are three types of interactive effects among policy instruments that are relevant. These include additive effects (Boonekamp 2006; Justen et al. 2013; Justen et al. 2013; Yi and Feiock 2012), as well as the counterproductive effects and synergies mentioned earlier (Lecuyer and Bibas 2012; Philibert 2011; Trencher and van der Heijden 2019).

There is indeed a broad consensus in the policy design literature that not all the effects of instruments in a policy mix are inherently complementary (e.g., Boonekamp 2006; del Río et al. 2011; Grabosky 1995; Gunningham and Grabosky 1998; Gunningham and Sinclair 1999; Howlett 2017; Tinbergen 1952), that some policy designs generate counterproductive responses from policy targets (e.g., Schneider and Ingram 1988, 1990a, 1990b, 1993, 1997, 2005), that some policy portfolios may be superior to others because they offer a reinforcing or supplementing effect (e.g., Hou and Brewer 2010), and that some tool combinations may be unnecessarily duplicative in one context but advantageous in another (e.g., Braathen 2005, 2007; Mantino and Vanni 2019).

Counterproductive effects are manifested, for example, when command-and-control regulation is used alongside voluntary compliance (Grabosky 1995), with each undermining the effectiveness of the other. This differs from more complementary additive effects which occur, for example, when command-and-control regulation to minimize undesirable modes of behavior is employed alongside financial incentives to promote more desirable ones by layering both incentives and disincentives together and having them both pull in the same direction (Hou and Brewer 2010).

An important element in current policy design thinking, therefore, is to try to maximize additive efforts that supplement each other while minimizing counterproductive ones, and perhaps neutralizing situations wherein instrument combinations are “developed without any sense of an overall conscious design” (Howlett and del Río 2015: 1235) and fall into disrepair or unintended contradictions (Daugbjerg 2009; Hou and Brewer 2010).

Existing Measures for Assessing the Character of Policy Mixes: Density and Intensity

Central to this analysis is the need for a clear(er) understanding of the precise kinds of interactions between the policy instruments arrayed in specific policy mixes: that is, how instruments relate to each other in specific contexts when they are combined in specific ways, and what impact this combination has on their contribution to the realization of policy goals. But what makes existing measures of policy mixes inadequate?

Two measures in particular feature in the current literature: density, or the number of policy instruments found in a mix, and intensity, or the manner in which those instruments are deployed in either a strong or a weak fashion. While density is a straightforward concept, intensity is more problematic as a wide range of intensity measures are possible, such as how many

objectives a mix is expected to achieve, the manner in which the instruments needed to reach these objectives are resourced, or the benefits and burdens affecting the target populations they entail (Bobrow 2006; Eliadis et al. 2005; Schneider and Sidney 2009).

Both measures were developed taking into account Howlett and Cashore's (2009) argument that all policies are composed of several distinct elements found at three levels of abstraction: the overall abstract goals of policies and governance preferences of enacting governments, the kinds of objectives and instruments used to achieve these goals, and the settings and calibrations in which the policies are applied. Based on Howlett and Cashore's (2009) premise that policy instruments are regarded as the core concept of policy output which can be designed, Knill et al. (2012) distinguished between the number of policy instruments deployed and the content of policy instruments, developing specific kinds of density and intensity measures.

Defined merely as the cumulative number of instruments deployed in a mix (Schaffrin et al. 2015), density is the most straightforward measure of mix complexity. However, merely arriving at a figure telling us how many instruments are deployed in a mix does not in itself tell us what the preferred level of density of a mix is. Whereas in the past, the Tinbergen maxim of one tool-one goal was often cited as an optimal density goal (Tinbergen 1952; del R o and Howlett 2013), more complex instances require us to delve into questions of tool interactions so as to better inform policy design practice, including the specification of optimal levels of policy tool density. Thus, to assess the effectiveness of a policy mix in the environmental area, for example, even if this just comprises price and quantity instruments, one must incorporate both synergistic and counterproductive tool relationships and interactions between these two tools (del R o 2010; Leplay and Thoyer 2011; Grabosky 1995) and control for procedural and spillover effects which might increase or decrease the number of tools and goals but in both cases beyond that of the Tinbergen target.

In dealing with and developing the concept of "intensity," Schaffrin et al. (2015) similarly relied on the same premise as Knill et al. (2012) regarding the need to look at both the "quality" and the "quantity" of tools used. To capture this qualitative aspect, they considered the content of the instruments deployed, focusing on their setting and calibrations. Thus, they defined policy intensity as the "organization and mobilization of resources" (Albrecht and Arts 2005: 888): that is, the amount of resources, effort, or activity invested in or allocated to a specific policy instrument. Like Hood (1983), they argued that resources are scarce and hence governments, *ceteris paribus*, would prefer to use "bureaucracy sparingly" so that the preferred level of intensity was that which would "get the job done" and no more.

Tosun (2013) and Knill et al. (2012) took this insight further in operationalizing the "intensity" of policy instruments related to clean air regulation as, for example, the stringency of emission limits for certain pollutants ("objectives"), the specific levels of a tax or subsidy ("calibrations"), and the size of the target group of a tax ("settings"). Schaffrin et al. (2015) likewise identified a systematic set of intensity measures – objectives, scope, integration, budget, implementation, and monitoring – which allowed them to weigh the different character or quality of a policy tool. This is similar to the analysis put forward by Attwell and Navin (2019) concerning the quality of the instruments deployed in the health sector to accomplish national vaccination programs, which, as noted earlier, focused on differences in scope, sanctions, severity, selectivity, and salience (Attwell and Navin 2019).

As with "density," however, what was an optimal level of intensity was unclear. Weighting differences in the respective "intensity" of the instruments' "calibrations" from the expectations of expert evaluations (e.g., Binder 1999; Coleman 1999; Mayhew 2005), for example, could differ widely from the preferences expressed in the media (e.g., Howell et al. 2000), reflecting

more popular beliefs about proper levels of resource use and misuse in specific policy areas from the control of crime to the provision of particular kinds of health-care services

Thus, effective policy design requires a more careful analysis of both intensity and density across policy areas and levels of government (Howlett and del Río 2015), as well as salience (Attwell and Navin 2019) than either measure has received to date. And this analysis should be undertaken beyond case- or issue-based assessments (Fernández-i-Marín et al. 2021). This is especially the case surrounding additive effects and synergistic or counterproductive interactions. A better method of evaluating instrument mixes characteristics is needed, one that distinguishes between different kinds of mixes and takes into account the three different types of interactive tool effects discussed earlier.

Assessing Additive, Synergetic, and Counterproductive Effects of Instruments in Policy Mixes

Developing such a method begins with the recognition that to quantify the degree of synergistic and counterproductive effects, one must first formulate a reference model that gauges expected policy effectiveness when there is no interaction between policy instruments.

This flows from the first principle in policy mix analysis, which concerns the additive nature of tool interactions. An additive effect is an effect that we expect to receive by simply adding together the impact of each individual policy instrument. This purposely does not include interaction effects so that these effects may be estimated in the second stage of analysis.

Simple addition is the basic interpretation of the measures put forward here – density and intensity – in which the basic nature of an instruments mix is determined by simply adding together the number of tools used in a mix and correlating this with the number of government resources utilized by each, without accounting for any other kinds of interactive effects (Oikonomou and Jepma 2008; Oikonomou et al. 2011).

This calculation generates a minimal model for an instruments mix in which four basic types of mixes exist, ranging from low density-high intensity mixes (such as Tinbergen's single tool deployment at the extreme) to the reverse situation in which many not-very-intense tools are deployed, such as in traffic control. In between, there are other possibilities such as a high density-high intensity mix deployed in important areas such as pandemic control and low density-low intensity mixes, which can be found in many areas in which mainly symbolic tools are deployed, such as in the encouragement of healthy lifestyles through infrequent and low-cost public service advertising.

Even discounting interactive effects, additive impacts are not necessarily automatic and do not necessarily occur all at once. Although one might expect that simply placing two policy instruments in a policy mix either initially or sequentially will theoretically result in additivity effects, in real-world applications, such additivity effects may not occur because, for instance, harsher policies may result in growing resistance by policy targets. A case in point is when more taxes lead to higher overall tax rates, giving rise to increased tax evasion and not necessarily the collection of more tax revenue. In other words, the relationship between the number of policy tools over a certain threshold and policy effects may be non-linear, and increasing the number of policy tools may result in lower-than-expected effects. Still, an additive measure or indicator of basic mix design is important because it provides a baseline and a measure of effort which can be used to detect and quantify synergistic or antagonistic effects. That is, any (substantial) deviation from simple additivity reveals synergistic or counterproductive effects.

Synergy is commonly described in simple terms as “ $1+1>2$.” That is, synergy occurs when the effect of two or more policy tools operating in a combination is greater than the (expected)

additive effect of the policy tools (del Río 2010; Lecuyer and Bibas 2012). Two policy tools exhibit synergy when, for example, one policy tool increases the effect of the other without any change in its original intensity. An example of synergy is the use of both taxes and information campaigns to discourage smoking. Combining the two provides a greater boost in non-smoking than simply using one or the other because the use of anti-smoking information campaigns not only reinforces the effects of tax increases on discouraging smoking among smokers but also affects non-smokers who might otherwise consider starting. Synergistic instruments mix can therefore suppress policy resistance to one of the tools in the policy mix, slow the evolution of policy resistance, and/or facilitate lower-intensity use of each policy tool, thus reducing unintended negative consequences upon being targeted with a given instruments mix. Synergism in tool-tool interaction is, therefore, more than an additive effect. It is the effect of two policy instruments working in a combination that is greater than the (expected) additive effects of these instruments. This potentially enables the attainment of a higher level of policy effectiveness while minimizing additional policy investment. Put differently, when policy instruments act synergistically, it may be possible to reduce policy investment in both instruments while still ensuring the desired level of outcome. The identification of synergistic instruments mixes, however, is challenging due to the infrequency of synergistic relationships. Still, synergies are more likely when tools have been selected in a non-political way.

The application of mixes of policy instruments may also produce lower responses. These counterproductive effects can be described in simple terms as “ $1+1<2$ ” or as the opposite of synergy. A counterproductive effect occurs when the combined impact of two tools is less than their additive effect. An example of such a subtractive effect can be found in the area of tobacco control, in which excessive taxation encourages smuggling and other forms of evasion. This has the effect of providing cheaper and more readily available products, undermining both the taxation and information provision tools used in prevention efforts. A more recent example in the area of the regulation of legalized cannabis products can be found in the promotion of responsible consumption campaigns coupled with weight- or volume-based taxation on sales. In some US states like Washington, this has led to large increases in the drug’s potency, offsetting or reducing the impact of responsible consumption campaigns (Barry and Glantz 2018).

Such counterproductive effects are often undesirable in policy effectiveness terms. This is rather obvious. However, it may be beneficial to have an antagonistic effect in a mixture of policy tools when these effects minimize or neutralize unwanted side effects created by one of the policy tools in a mix. In addition to making sure that other policy instruments will not get out of control, antagonistic effects may be desirable for political reasons when, for example, elected executives use a highly visible policy tool that benefits their competitor’s political base alongside a less visible tool which can counteract these benefits. This can occur, for example, when increased property taxes offset education grants to schools in specific neighborhoods or regions. Such cases sit squarely within the category of deliberate disproportionate policy responses (Maor 2017, 2021).

Methodological Issues in Capturing Instruments Mix Superiority Over Individual Policy Instruments

Understanding both these more and less than additive effects is a serious issue in policy design as missed synergistic and counterproductive reactions can lead to a policy over- or under-design (Maor 2020). And the same is true of incorrectly specified additive or subtractive mixes. It is crucial to improve design practice by better understanding these constructs in order to avoid unintentional errors and correctly search out and deploy (or not) synergies and

counterproductive effects. Towards this end, several methods for evaluating instruments mix effectiveness currently exist.

In general, two approaches to assessing instrument combinations' impact on outcomes can be advised. The first involves an "effects-based" assessment strategy. In this strategy, the idea is to carefully deploy policy instruments individually and sequentially in policy mixes and gauge their impact directly, in real time, on the kinds of outputs which emerge from their implementation (Tupper and Doern 1981). This can be done on a small-scale experimental basis but is a challenging approach, given the need to control for many variables, including implementation barriers, capacity, and other resource issues in assessing policy impact, as well as a host of measurement problems associated with both tool deployment and output assessment.

The second approach utilizes input efforts as a proxy for output and can be termed the "effort-based" approach. In this approach, measures of the effort put into deploying a policy mix by a government are used as a proxy for policy effects. This strategy is much easier to accomplish. But it may fall down precisely in not being able to assess the impact of effort on effects. In addition, it is capable only of assessing known additive, counterproductive, and synergistic impacts.

Effect-Based Strategy

The effect-based methodology is complex and requires construction of a baseline of the effects of individual tool deployment on goal attainment and then comparing the effects deriving from a mix of instruments to those stemming from the individual performance of each of the instruments involved.

Three possible results facilitating a conclusion of positive, negative, or null effect are relevant here. First, the policy mix, comprised of at least two policy instruments that are individually non-effective, can produce a (statistically) significant effect greater than the effect produced by its individual components. Second, the same kind of policy mix can result in (1) an effect which is greater than, equal to, or less than the additive effect produced by its individual components and (2) a difference between the two effects which also reaches statistical significance. This provides evidence of the superiority of the policy mix compared to the deployment of its single policy instruments. Third, the effect of such a policy mix can be greater than the (expected) additive effect given by the sum of the individual effects. This approach enables us to assess synergy by comparing the observed effect of a policy mix to an (expected) effect from additivity. If the observed effect of a policy mix is lower than the effect from additivity, it can be classified as counterproductive.

These kinds of effect-based evaluations require careful and systematic analysis of policy effects over time and may not be useful in many time-delimited circumstances or when the enactment of multiple partial efforts at problem resolution are infeasible. However, it can be done in ongoing, slow-moving areas such as housing or the regulation of drug abuse, where partial measures may be introduced on an experimental or trial basis. A recent advance, in the form of an index that captures whether governments tend to reuse the same policy instruments and instrument combinations or produce policies that are tailored to the problem at hand, can assist effect-based evaluations by providing prescriptive statements about the extent to which the policies in a given sector are effective in achieving their objectives (Fernández-i-Marín et al. 2021).

Effort-Based Strategy

Alternatively, one may employ a methodology which focuses on the effort that policymakers invest in attempting to accomplish a policy's goals (Winter 2006; Howlett et al. 2009; Bauer and Knill 2014; see also Bondarouk and Mastenbroek 2018).

Here it is argued that policy instruments that are characterized by higher intensity have more effort invested in them (Schaffrin et al. 2015: 262) as are combinations that have higher density levels. The literature highlights five measures of intensity, three of which are resource related, which can be used to gauge this effort: the number of staff assigned to work on a problem (Hartlapp 2009; Tosun 2012; Bauer and Knill 2014; Schaffrin et al. 2015); the types of expertise, i.e., informational resources, employed to support policy implementation (Radaelli and De Francesco 2007; Bauer and Knill 2014; Schaffrin et al. 2015); and the financial or budgetary resources allocated to the implementation of policy goals (Bauer and Knill 2014; Schaffrin et al. 2015). The fourth aspect of effort concerns the prioritization of goals and measures within one policy (Winter 2006), with higher intensity implying more effort is invested in prioritizing some goals or measures over others with regard to the use of the policy instrument. The fifth aspect of effort is monitoring (May and Winter 1999; Howlett et al. 2009: 185; Beijen 2011: 159; Tosun 2012: 442; Bauer and Knill 2014: 34; Schaffrin et al. 2015: 264), with higher intensity implying more effort is invested in assessing the quality of policy tool performance than where such follow-up is poorly executed or nonexistent (Vedung 1998; Hartlapp 2009). It is also argued here that measuring effort may be an indication of political commitment and that effort-based strategy allows us to encompass “how” a policy tool is employed (e.g., how creatively policy-relevant information is communicated), rather than solely the amount of money invested in communication. Here, quantitative measures may play as important a role as qualitative ones.

In this effort-based approach, a policy mix comprised of two policy instruments, one with a higher level of intensity than the other, may produce the same effect as a policy mix in which the former instrument has a lower intensity than the latter. The idea here is to discover at what intensity level for specific kinds of instruments the mix of instruments produces the greatest effect. As for density, the same logic applies: more dense mixes require more effort but may not generate greater impacts than less dense ones. This method is easily understood but still requires an accurate assessment of the effects of tool deployment, which is lacking in most areas. Simply correlating effort with some outcome variable (such as employment or carbon-reductions or policy adoption) remains unsatisfactory as the correlation may be spurious.

Discussion: Conceptual and Methodological Issues in the Analysis of Instrument Combinations

Based on the analysis presented here, several lessons can be derived for instruments mix research. First, it is essential not to confuse synergy between policy tools and policy additivity. Synergistic effects must go beyond additivity, but this requires accurate baseline information on individual tool performance to determine additive expectations against which synergistic effects can be measured. In addition, deviations from additivity may be caused by measurement problems rather than interactions between policy instruments. Thus, the larger the sample used, the more likely it is that such deviations represent policy-relevant effects.

Second, it is important not to confuse synergy between policy tools and policy effectiveness. Whereas synergy is a measure of the kinds of interactions present between policy instruments, policy effectiveness is a measure of the unique result of the specific policy mix containing these instruments. This distinction highlights the possibility that the scope of synergy may shrink when one policy instrument in a mix is employed at a high intensity, and this, in turn, may result in a loss of effectiveness. Beyond a certain point, its independent effect may elicit near-maximal effectiveness, leaving little room for the other policy instrument to improve its effectiveness.

Third, there are many issues related to the measurement of synergism and interactivity which need to be addressed through careful empirical study and experimentation. This is especially

the case with the need to examine policy mixes comprising more than two policy instruments. The decision on which to engage in a specific task and at what level depends on the feasibility of assessing the contribution of each instrument.

Fourth, scholars and practitioners need to recognize that synergism is not solely a statistical issue. The idea is to gauge the possible mechanisms that underlie the observed synergy between policy instruments, as well as the key variables that enable us to predict features mediating observed or experimental synergy between policy instruments and to distinguish between weak and strong synergistic effects, as well as between weak and strong counterproductive effects (Capano et al. 2019). A data-driven approach is needed to address these questions

Fifth, there is another whole set of issues around temporality and the time-based nature of some effects. Measures and methods which may work well for single-time point impacts may deal less well with interactions that occur over time, including the sequence in which policy instruments are added to a mix (Taeihagh et al. 2013). Variation in policy feedback effects may also play a role here.

Conclusion: A Call for More and Better Analysis of Instruments Combinations

Combining policy instruments does not guarantee a priori an increase in efficacy over a single policy tool. Therefore, it is desirable to identify combinations with effects greater than what is achieved with either policy instrument alone. Policy instrument and policy design scholars are consequently interested in the interaction effects when combining a policy instrument with other instrument(s) in a policy mix (Kern et al. 2019). Understanding the interactions among policy tools is vital because combinations of policy tools could be used to target a broader range of policy problems. Such combinations could also serve as solutions against poorly specified emerging and re-emerging policy problems that are resistant to individual policy instruments. A significant challenge exists in this area as a policy mix may be composed of interacting policy instruments that synergize or cancel one another's effects (Grabosky 1995). The need to control for and plan synergistic and additive effects in policy mixes necessitates a search for the effectiveness of individual tools and their combinations: that is, assessing their contribution to the joint response of a policy mix.

In this chapter, we have emphasized the need to increase the dialogue among policy scholars dealing with instrument combinations in different domains by advancing a common vocabulary and stressing the need to follow a specific methodology if the field is to advance. We discussed the various terms surrounding interactive effects and provided a minimal set of concepts and methods for their detection. We also discussed the advantages and limitations of effects- versus effort-based methods. Of course, this does not eliminate the need to address other questions related to instrument combinations but instead suggests an order to their assessment.

There is also a great need for more comprehensive and sophisticated pre-implementation instruments mix analyses to guide the selection of policy instrument combinations suitable for implementation more successfully. Primarily, there is a need to develop methods to maximize synergetic tool interactions while minimizing their unintended negative consequences that take advantage of integrated policy development processes and their statistical and experimental analyses. Here, policy scholars and practitioners should recognize that some synergistic instrument combinations may be superior to other synergistic combinations in terms of policy effectiveness because not all synergistic effects are without cost. The search for synergistic tool interactions cannot be unconstrained because, theoretically, the scope of synergy may shrink when one policy instrument in a mix is employed at a high intensity.

Intriguingly, there is also a theoretical possibility that more antagonistic instrument combinations may slow the evolution of policy resistance, non-compliance, and gaming. This may occur in rare cases when a policy landscape is deliberately designed in a way that is difficult to comprehend, thus restricting the evolution of opposition to the policy at hand as well as gaming opportunities. For example, a policy landscape might be created by a three-instrument-combination in which each tool pair interacts antagonistically but the full emergent interaction between all the instruments in the policy mix is synergistic.

Finally, another avenue for future research is the study of the conditions leading to disproportionate policy responses – both over- and underreacting to problems (Maor 2012, 2014a; Maor et al. 2017) as well as policy bubbles (Maor 2014b, 2016, 2019) – and the role of instruments' interaction effects in the creation and correction of such disproportionate responses.

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