Duality, Liberty, and Realism in Entangled Political Economy

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Abstract

The work concentrates on the implications of the idealistic and the political realism senses of protecting classical liberalism for entangled political economy through the economics framework of duality. It finds that entangled political economy reveals a failure of the primal problem of duality, but not of the dual one. The modeling survival of the dual problem suggests that the minimization of coercion is what can (and must) be genuinely solved to protect classical liberalism. The solution hinges on institutional design as opposed to allocative choice. And this solution implies that the relationship between liberty and coercion is itself entangled.

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Prefatory Note

In 2000 or 2001, while a graduate student at the University of Connecticut, Storrs, I (Giampaolo Garzarelli) had a conversation with a young public finance professor about Public Choice and public finance. To my surprise the young professor insisted that Public Choice had been *accepted* by neoclassical economics, implying with this that Public Choice was good economics being now a subset of neoclassical theory. I suggested that Public Choice could never fully be a subset of neoclassical theory, notwithstanding the fact that Public Choice also employed mathematical and statistical methods, because of the different philosophical starting points of the two research programs (teleological and a-institutional the neoclassical, processual and institutional the Public Choice). He looked at me *as if* I should not pose myself such 'nonrigorous' problems at all. Back then I did not know what I know now, which makes me realize, among other things, that my emphasis should have been more on Constitutional Political Economy than on Public Choice. We also did not have, to the best of my knowledge, entangled political economy – at least as clearly defined as now. Recently, I have come to realize that writing this paper with Lyndal Keeton and Aldo A. Sitoe represents a subconscious attempt to differently articulate some parts of my original argument that was born from youthful exuberance.

> *Rationalists, wearing square hats,*
>
> *Thinking, in square rooms,*
>
> *Looking at the floor,*
>
> *Looking at the ceiling.*
>
> *They confine themselves*
>
> *To right-angled triangles,*
>
> *If they tried rhomboids,*
>
> *Cones, waving lines, ellipses –*
>
> *As, for example, the ellipses of the half-moon –*
>
> *Rationalists would wear sombreros.*
>
> *— Stevens (1923, webbed version)*

> *Models are undeniably beautiful, and a man may justly be proud to be seen in their company. But they may have their hidden vices. The question is, after all, not only whether they are good to look at, but whether we can live*

happily with them.

— Kaplan (1964), as quoted in Aris (1994: 104)

… all models are wrong, but some are useful.

— Box and Draper (1987: 424)

1. Introduction

This work deals with some theoretical considerations related to entangled political economy – the political economy framework envisioned by Richard E. Wagner that considers the conduct of private and public actors (consumers, entrepreneurs, firms, politicians, etc.) that share the same social environment as being naturally dependent on each other. It focuses on the main motivation of entangled political economy, which is shared with Constitutional Political Economy – namely, the protection of classical liberalism (Novak and Podemska-Mikluch 2022: Table 2).

The "mental model" (Denzau and North 1994) of classical liberalism can vary according to context (for example, economic, methodological, philosophical, political), time period, and even geography. (See, e.g., Johnson's 2023 overview of the model in a related discussion.) It is consequently difficult to settle on it univocally. Our point of orientation is to settle on what we consider to be the key moral of what the mental model stands for in practice (among others, Hayek 2013a [1973]; Ostrom, Walker and Gardner 1992; Buchanan 2000a). Classical liberalism believes that people are more likely to flourish in a polity where there are also public institutions that help to daily discipline, govern, and safeguard personal spheres of autonomy of action. It is not the direct exercise of authority, fickle intervention, and social planning that let people reach peaceful consensus on social choices; rather, it is the rules of the game that permit, for all, free and sincere conversation, learning from mistakes, and open interaction that matter the most for social order. For reasons of shorthand, from now on we will refer to classical liberalism simply as liberalism.

Entangled political economy sees the protection of liberalism from two perspectives (Burnham 2020[1943]: 3-20). The first perspective is sentimental or idealistic, where "human governance could be reduced to ethics, law, and commerce, leaving no room for the political insertion of force into society" (Wagner 2017: 14). The other perspective is the muscular or pragmatic one of political realism where states and their governments exist, and cannot be abstracted from (e.g., Mill 1965[1848]: 799-971). In this *realpolitik* perspective (Buchanan 1999a [1979]), "free societies are not self-sustaining, and can degenerate without the proper use of force" (Wagner 2017: 14). Put differently, the sentimental perspective considers protecting liberalism by maximizing liberty; while the muscular perspective considers protecting liberalism through the minimization of coercion. In what follows, we consider the implications of both these perspectives for entangled political

economy through the economics framework of duality.

Duality is a useful formal tool of economics that allows the derivation of the structure and solution of one problem (known as the primal) from the structure and solution of another, related problem (known as the dual) (e.g., Blume 2017[2008]).[1] For example, in microeconomics we can solve the primal of utility maximization also as its dual, i.e. as an expenditure minimization problem. To our knowledge, duality has not yet been studied within entangled political economy. We attempt to fill this lacuna through the lens of liberty and coercion duality.

We find that in an entangled political economy framework the problem of maximizing liberty differs in practice from the problem of minimizing coercion. Entangled political economy in fact reveals a failure of duality, a problem that does not exist under more familiar economics approaches. But entangled political economy also reveals that not all is lost. The failure regards the primal and not the dual problem. If one considers the muscular problem of how to minimize coercion as opposed to the sentimental problem of maximizing liberty, then the problem's solution hinges on institutional design as opposed to allocative choice. What this ultimately means is that the only concrete way that we have at present to protect liberalism is to minimize coercion. And this conclusion implies that the relationship between liberty and coercion is itself entangled.

We will see how the increased realisticness – roughly the practice of incorporating more elements of reality into a theory (Mäki, e.g., 1989), which in our case includes realism in the pragmatic political science sense – of entangled political economy improves our ability to explain. In essence, the current edge of entangled political economy concerns our ability to explain more than our ability to predict. This edge is typical of more realistic social theories (Leijonhufvud 1997). Substantively, coercion explicitly emerges as an instrument for both sustaining and suppressing liberty.

2. The Coercion-Liberty Nexus

The definitions of coercion are many. They are not mutually exclusive. But involve different degrees of refinement (e.g., Nozick 1969; Anderson 2021). The useful refinement for present purposes considers that coercion occurs when someone is forced by others to do something that they would not otherwise be willing to do of their own volition. The coercion can be private or public (Carden, Meadowcroft and Murtazashvili 2022). A paradigmatic example of private coercion is being mugged at gunpoint. When it comes to public coercion, we can think about the establishment of the state in light of its comparative advantage in violence (North 1981; Olson 1993) and all that comes with it post-constitutionally (Buchanan, e.g., 1990), such as social choices based on the majority's will, income and other forms of tax, and the legal requirement to drive on the right- or lefthand side of the road.

Let us now turn to the definition of liberty. One classic definition suggests that liberty is simply the absence of coercion (e.g., Knight 1941). However, this definition is too narrow for present purposes. One helpful extension of it distinguishes between "natural liberty" and "civil liberty" (Buchanan and Lomasky 1984). Natural liberty manifests in the absence of public coercion. But this would be a world where another form of coercion would dominate, namely the private one, where

individuals are more likely to invade the will, and, more generally, the spheres of authority and autonomy, of others through violence and predation. Here we would not be in the presence of a polity – a civil society with a liberal democratic state. Rather, we would be in the presence of a Hobbesian jungle.

Hence the world of natural liberty remains, for the most part, an ideal.[2] And this leaves us, by difference, in the world where liberty is genuinely civil liberty. In this other world, the advantage in violence of the state trumps the one of the state of nature.[3] But the trumping is partial, not complete. There are no free lunches. Rather, rational and reasonable people always reach compromises. For to be in a world of liberty-as-civil-liberty means to be in a polity where there is the enjoyment of "liberty correlatively with a set of duties on the part of other persons to respect such liberty, duties which are enforceable by the agency of the collectivity" (Buchanan and Lomasky 1984: 18), such as a state. Thus, under liberty as intended here coercion is naturally present (Buchanan 2000b [1975]).

Musgrave agrees. "Liberty … is not to be defined as absence of restraint and self-centered interest only. Rather, a meaningful concept of liberty calls for limitations imposed by mutual concern for others" (Musgrave 1999: 33).

Perhaps more interesting is that Mises also notes the public coercion-civil liberty relation.

> In nature there are no such things as liberty and freedom. There is only the adamant rigidity of the laws of nature to which man must unconditionally submit if he wants to attain any ends at all. Neither was there liberty in the imaginary paradisaical conditions which, according to the fantastic prattle of many writers, preceded the establishment of societal bonds. Where there is no government, everybody is at the mercy of his stronger neighbor. Liberty can be realized only within an established state ready to prevent a gangster from killing and robbing his weaker fellows. But it is the rule of law alone which hinders the rulers from turning themselves into the worst gangsters (Mises 1981[1936]: 568).

The essential points to be emphasized from the discussion so far are two. The first is that the connection between civil society and the state embeds a nexus between liberty and coercion. Without some minimal level of public coercion, society returns to the state of nature vulnerable to unconstrained private coercion in which, all things remaining the same, liberty would be a random occurrence. This is a consideration that can be traced back at least to Thomas Aquinas and that scholars of coercion still have at the core of their research program. The second point is less explored, and represents our main concern – namely that the coercion-liberty nexus is likely entangled.

3. Entangled Political Economy

Wagner's (e.g., 2016a, b; 2019) dissatisfaction with more familiar economics approaches – what he refers to as "additive political economy" – rests on the economy and the polity being separable social spheres of action. The relationship between polity and economy is additive because the two are left unchanged in their original nature after interacting; that is, the two spheres remain crisply distinct notwithstanding their interplay. There are no ephemeral or lasting cross-

fertilization, cross-parasitism or conflictual relations (Garzarelli and Galli 2020) that lead to blurry boundaries between political and economic action. All reverts to the original position before an interaction.

Entangled political economy instead follows in the footsteps of the classical political economists, especially those in the Smithian (Smith 1981[1776]; Weingast forthcoming) and Mengerian (Horwitz and Koppl 2014; Novak and Podemska-Mikluch 2022) traditions, and of the Italian *Scienza delle finanze* (e.g., Fossati 2010; Wagner 2018). Both stances in fact see economics concerning exchange rather than allocation, and economy and polity influencing each other. Moreover, the polity-economy interactions are not once-off and without memory but can persist and shape future interactions. They are complex, not necessarily foreseeable, and likely to stay entangled. In this way political and economic phenomena generate unintended consequences. In some cases, the consequences create gains, such as entrepreneurial profits, in others losses, such as rent-seeking windows (Wagner 2016a, b).

This naturally feeds into an important entangled political economy distinction, namely that between dyadic and triadic interactions. While dyadic interactions are always mutually beneficial and, as a result, are entered into always voluntarily, triadic interactions can be voluntaristic (interactions that are triadic by invitation) as well as coercive (interactions that are triadic by assertion). Typically, we find dyadic interactions in the market and triadic interactions in the state. Dyads interact in a market order maintained by the state but they do not interact with the state directly. This characteristic grants stability and closure since dyads are residual claimants of any liabilities (legal or economic) that may result from their actions. Matters are different in triadic (by assertion) interactions. In triadic interactions, the state not only maintains the market order, but it also seeks to change it through coercion. Coercion allows some individuals to secure benefits in triadic interactions more cheaply than they could secure in dyadic interactions. This is evidenced by the parasitical nature of political pricing (e.g., Pantaleoni 1911a, b; Wagner 1997; Podemska-Mikluch and Wagner 2013). The bottom line is that with entangled political economy we find both dyadic and triadic interactions, which create a social ecosystem where there can be both indeterminacy and disequilibrium.

Entangled political economy moreover draws our attention to the limitations of closed-ended theorizing. Within closed-ended theory, individuals do not really choose, but face single exits; that is, situations where, given the constraints faced, there is only one rational course of action (e.g., Neves 2004). Cost functions, individuals' preferences, and utility functions are predetermined, in that they are unaffected by the pattern of social interactions. The maximization (or the minimization) problem, the solution, and the means to reach the solution are all known in advance. Hence "choices" are mechanical and predictable (e.g., Buchanan 1999b [1964]; Boettke 2011). Given predetermined preferences and constraints, Ockham's razor dictates that we reduce society to an anonymous ideal type, namely the representative individual. Once this reduction is done, the explanation of the process that links the pursuance of individual objectives to social objectives becomes irrelevant since they are indistinguishable (Wagner 2010). As a closed-ended theory has but only one outcome, the theory suggests far greater potential for accurate prediction than what exists. In closed-ended theory, any explanation of how observations in different social orders (quintessentially: market and state) emerge out of the pursuit of individual objectives is circumvented by reducing complexity.

Closed-ended theorizing allows for the scalability of interactions. A polity is simply individual interactions scaled up. There

is no difference between micro (individual level) and macro (society level) interactions. The quality of interactions remains essentially the same irrespective of size. Figure 1 illustrates complete social interactions among individuals a_{ij} with $i, j = 1, 2, 3$. Interactions on the righthand side are scaled-up versions of interactions on the lefthand side; *mutatis mutandis*, interactions on the righthand side are reduceable to the interactions on the far lefthand side. Scalability forecloses any genuine consideration of coercion since we scale up voluntary interactions as we move from (a) to (c). The micro and the macro, therefore, are equivalent dyadic interactions. For modeling purposes, only the arguments (e.g., cost functions, preferences, and utility functions) have to be suitably scaled (Wagner 2016b).
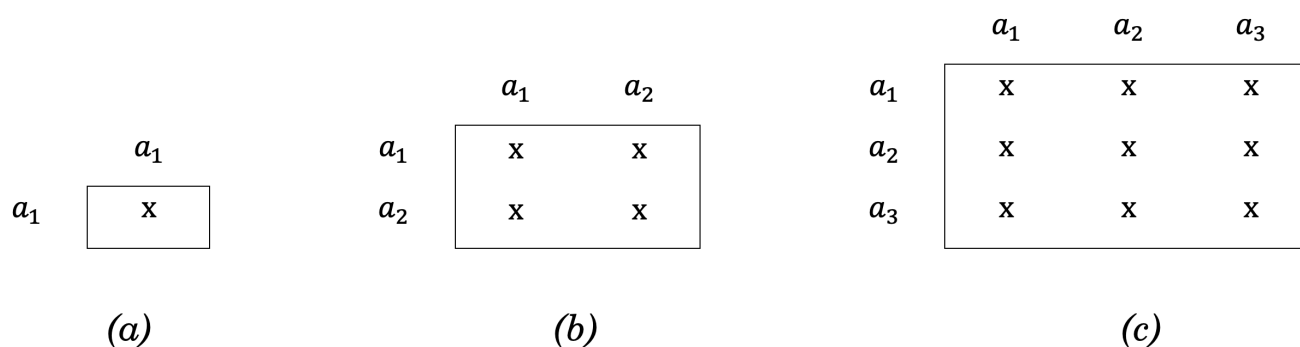
	a_1
a_1	X

(a)

	a_1	a_2
a_1	X	X
a_2	X	X

(b)

	a_1	a_2	a_3
a_1	X	X	X
a_2	X	X	X
a_3	X	X	X

(c)

Figure 1. Scalable Interactions

In contrast, entangled political economy draws our attention to open-ended theory where cost functions, preferences, and utility functions are not predetermined, but can depend on social interaction. In open-ended theory, the polity is not reduced to a representative individual, because the different people may choose different outcomes even when faced with the same constraints. We cannot infer cost functions, preferences, and utility functions from choices because choices provide ambiguous information. To attempt to reduce the ambiguity, we need to do our best to also consider and explain the context and process that leads to choice (Kirzner 1976; Wagner 2010). What is lost in terms of predictability under closed-ended theory, is gained in terms of explanation (e.g., Koppl and Whitman 2004; Garzarelli and Infantino 2019).
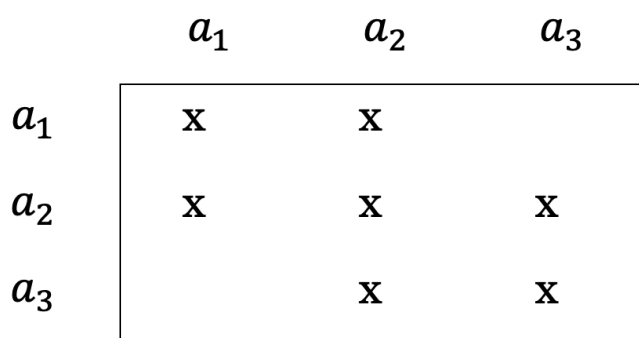
	a_1	a_2	a_3
a_1	X	X	
a_2	X	X	X
a_3		X	X

Figure 2. Non-scalable Partial Interactions

Within an open-ended theory, individual interactions are not scalable to get social outcomes as is possible in closed-ended theory. As we have lost our ability to infer cost functions, preferences, and utility functions from choices, we no longer have complete interactions but partial ones. Figure 2 shows an open-ended theorizing in which we have partial interactions among individuals a_{ij} with $i, j = 1, 2, 3$. Partial interactions have an advantage as they are more realistic. For we have incomplete knowledge (Hayek 1945) in the mind of any particular individual about all others, and, more generally, the world. However, the disadvantage is that it is not possible to scale the interactions down (or up) and still maintain accuracy as is the case in Figure 1. Moreover, when theory is open-ended the number of interactions is also significant: the number of interactions adds complexity by reducing the accuracy of the model.
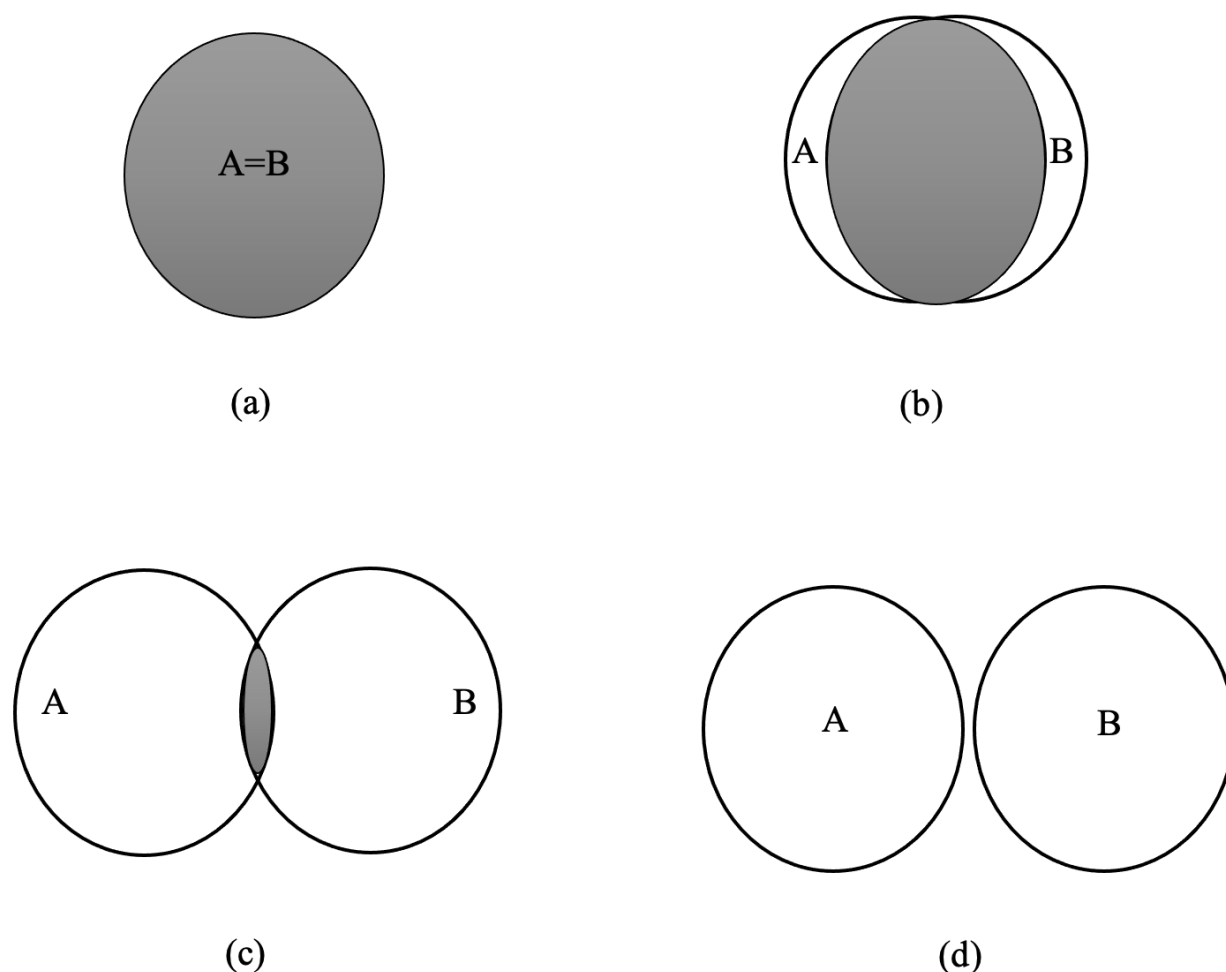

Figure 3. Predictability and Explanation

The takeaways can be summarized in Venn diagram form as in Figure 3. Circle A represents information at the individual level and circle B represents information at the societal level. The overlap between A and B – the area in grey – illustrates the extent to which society can be represented by an individual. Thus, greater overlap between A and B also means greater ease with which individual interactions are scalable to obtain societal results; further, the greater is our ability to predict as less additional information is needed to infer societal observations from individual observations. Starting from

(a) we can see that there is full overlap between society and the individual; as a consequence, a representative individual's actions would perfectly predict those of society. As we move from (a) to (b), and then to (c), the predictability decreases as there is less and less overlap between the individual and society. Finally, in (d) we see that there is no overlap and it is not possible to use a representative individual to make predictions for society. Instead, as the overlap between the individual and society decreases, we require greater explanation to understand actions and interactions. Consequently, as we move from (a) to (d), explanation increases in importance.

If the scientific objective is predictability as, e.g., in Friedman (1953), then a theory moving towards (a), such as additive political economy, should be the choice. Instead, if the scientific objective is explanation as Wagner (e.g., 2010) argues, then a theory moving towards (d), such as entangled political economy, should be the choice. But (a) and (d) are two ideal-typical extremes. The point is that both predictability and explanation are important properties of a theory, hence a move towards (c) is desirable. But at times we cannot have both predictability and explanation – at least in the mix that one would prefer.

Let us make the same point less theoretically and more methodologically. Maximizing liberty and minimizing coercion are the two sides of the same problem only when economic theory is defined exclusively in terms of the logic of choice, which yields additive political economy – Figure 3(a). But the logic of choice is necessary, though not sufficient, for explanation. We also need, as we will see, the logic of choice filtered through institutions. It is the latter approach that generates non-scalable outcomes. Hence, Figure 3(b), where A is just the logic of choice (or pure theory), B refers to factual and historical outcomes, and the overlap between A and B is the logic of choice filtered through institutions (or applied theory). If this is about correct, then we should indeed desire a tendency from 3(b) to 3(c). A tendency that is consistent with entangled political economy. (A move to 3(d) would imply historicism – a complete severing of the logic of choice from facts and history, rejecting the universality of purposive human action.)

4. Duality, Liberty, and Realism

4.1. Duality of Liberty versus Coercion: The Additive Framework

Assume two publicly provided goods, g_1 and g_2, generating some level of liberty, $U(g_1, g_2)$. We could proxy for liberty in different ways, freedom to trade, standard of living, etc.

In Figure 4, the curve $U(g_1, g_2)$ illustrates all combinations of goods that provide the individual with the same level of liberty. To obtain more of one good, the individual must sacrifice some of the other good. Therefore $U(g_1, g_2)$ – which can be thought of as a *liberty curve* – is downwards sloping. The slope of the liberty curve tells us the rate of the trade-off of one good for the other, holding the level of liberty constant. Since we assume that the individual prefers more to less liberty, the individual obtains a higher (lower) level of liberty from a combination of goods above (below) those on $U(g_1, g_2)$.

The choice between g_1 and g_2 becomes meaningful only when the individual faces a constraint. The individual's income – or the total amount of money to be spent on goods g_1 and g_2 – Y, and the corresponding tax prices for the goods, t_1 and t_2, define the individual's constraint, $\frac{Y}{t_1} \frac{Y}{t_2}$, which we refer to as the *coercion constraint*. There are two main reasons for this reference. First, taxes are not voluntary disbursements. Rather, they are a forced revenue extraction from the natural power asymmetry between individual and state. Second, the individual can afford fewer goods as the constraint shifts inwards when the tax increases.[4]
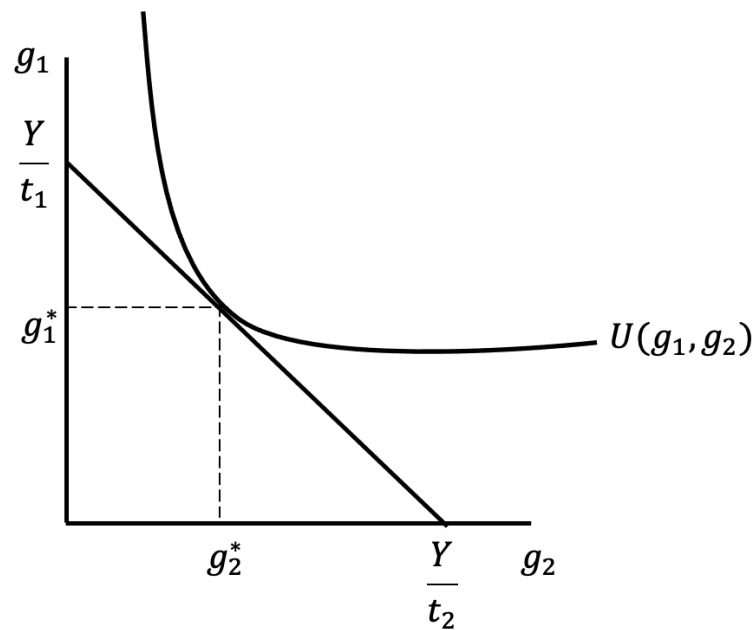

Figure 4. Liberty and Coercion as a Dual Problem in R_+^2

If the individual completely forgoes g_2, she gets $\frac{Y}{t_1}$ of good g_1. Instead, if the individual completely forgoes good g_1, she gets $\frac{Y}{t_2}$ of good g_2 . Between these two extremes, we have the quantities of g_1 and g_2 that, in combination or bundle, exhaust the individual's income Y. The coercion constraint, therefore, tells us the maximum quantity of one good that the individual can afford given the other good.

The coercion constraint $\frac{Y}{t_1} \frac{Y}{t_2}$ in Figure 4 is also downwards sloping. The slope of the constraint tells us the rate of the trade-off of one good for the other, holding income constant. This trade-off is the reason why the individual must choose.

We can now consider how the individual chooses between the quantities of g_1 and g_2 to maximize liberty. Combinations of g_1 and g_2 above the coercion constraint are unaffordable, hence not feasible. Combinations of g_1 and g_2 below the constraint are affordable. However, they do not meet the principle of non-satiation (i.e., that the individual prefers more to

less liberty). The individual is as a result left with combinations of g_1 and g_2 on the coercion constraint. Combination $(g_1{}^*, g_2{}^*)$ gives the highest level of liberty, $U(g_1{}^*, g_2{}^*)$, that the individual can attain given coercion.

Under an additive framework, the problem of maximizing liberty has a dual – the problem of minimizing coercion. The primal problem of maximization requires that we find the highest attainable liberty given the level of coercion. In Figure 4, the highest attainable level of liberty is where the liberty curve is tangent to the coercion constraint, i.e. $U(g_1, g_2)$. Instead, the minimization problem requires that we find the lowest attainable coercion given the highest attainable liberty. The minimum attainable coercion is also where the coercion constraint is tangent to the liberty curve. In both problems, the tangential point, the solution or equilibrium, is $(g_1{}^*, g_2{}^*)$. See the Appendix for a formal treatment.
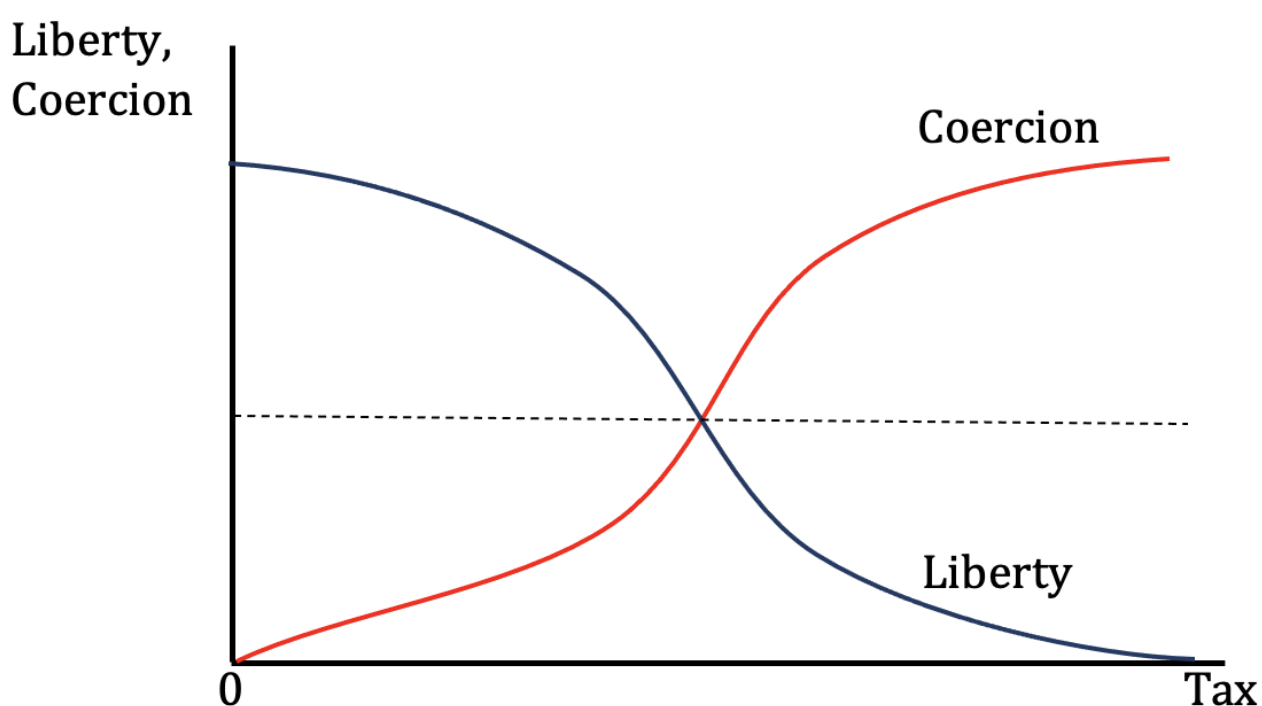

Figure 5. Duality of Liberty and Coercion from Another Vantage Point

A corollary of the liberty and coercion duality is shown in Figure 5. As per the mathematical relationship, when we have both liberty and coercion as a function of taxes, we can see a symmetry in that as coercion increases, liberty falls; and vice versa. The duality of liberty and coercion therefore also implies a perfect negative correlation between the two variables. It furthermore suggests that both variables can be independently calculated – for example, in this case, as a measure of taxes. While these implications are mathematically correct, we must also inquire into whether these implications are sensible in relation to reality, and align with our earlier reflections about coercion and liberty.

4.2. The Entangled Political Economy of Liberty and Coercion

The outcome from the additive approach to duality is that whether we choose to maximize liberty or to minimize coercion,

we achieve the same result. Maybe more important is the fact that we conveniently have both solution options at our disposal. Within its assumptions, duality from the additive approach is both logically and mathematically sensible. Moreover, duality is an elegant, compact and useful problem-solving tool. We therefore plead *nolo contendere* for duality under additive political economy. But what happens to duality if we consider the more realistic theoretical turn implied by entangled political economy?

Consider the primal problem first, namely the question of maximizing liberty. Hayek (1967: 348-349) explicitly grappled with this problem contending that "a happy state of perfect [liberty] might conceivably be attained in a society whose members strictly observed a moral code prohibiting coercion." Yet Hayek perceives the intractability because, he continues, "[u] ntil we know how to produce such a state all we can hope for is to create conditions in which people are prevented from coercing each other. But to prevent people from coercing each other is to coerce them. This means that coercion can only be reduced or made less harmful but not entirely eliminated. How far we can reduce it depends in part on circumstances which are not in the control of that organ of deliberate action which we call government."

Three related points from this Hayekian passage need highlighting. The first is that a condition of perfect liberty remains utopian. As we have seen, we do not yet know how to permit perfect liberty for all without the employment of some degree of coercion, which is an inconsistency as the attainment of liberty should be possible independently of coercion. The second point is the reverse side of the first. In any society there is an *autonomous component of coercion.* The amount of coercion is always positive, never zero. In the polities – recall: civil societies with a liberal democratic state – that we know, both private and public coercion are present in the autonomous component. At the very least, there will always be some muggings. The relevant issue is that in these cases it is not just that both private and public coercion are present, but that in their entanglement public coercion outperforms private coercion. This is not tantamount to saying that a society cannot exist without a state. But it can be read as saying that certain types of societies coevolve with the state (e.g., Elias 2012[1939]); namely, that in a polity the state itself, including its government, is an aspect of society.

The third point is less explicit. It establishes that not all the public amount of coercion comes from the direct management of affairs by government. By difference, this means that in part coercion comes from institutions – those rules of the game, especially, for our concerns, public ones, that substitute discretionary intervention (e.g., legislation, tax code). This is not to say that institutions are the efficient causes of behavior as in, say, Emile Durkheim, or that, e.g., culture, ideas, and mores are extra-economic. Rather, the point is simply that institutions can influence the choice of rational and reasonable people by making available information that would not be otherwise available (Rowe 1989).

The rules of the game in fact orient action by revealing options and constraints. We can as a result point to the two sides of an institution that are simultaneously at work. On the one side, an institution rewards some generally-accepted rule-following behavior. When all drive on the same side of the road, there are benefits for the individual (less likely to be in an accident) and for society (order through coordination). On the other side, an institution punishes behavior that contradicts generally followed rules. If someone drives on the wrong side of the road, then there are costs for the individual (more likely to be in an accident, to get a traffic violation ticket, etc.) and for society (others being involved in the accident, insurance premia rising, increase in law suits, disorder from lack of coordination, etc.). The basic lesson from the third

point is that in a polity individuals do not confront choice under a *tabula rasa*. Rather, choices are institutionally embedded (Foss and Garzarelli 2007).

At this juncture, the relevant question is the following. How are different levels of liberty permitted?

Consider an illustration where liberal democracy (a polity) and totalitarianism are ideal-typically compared. It is surely not the level of liberty that is under the control of these two kinds of government. Rather, it is the level of coercion. Totalitarianism always tries to assert explicit control. To do so, it uses maximum – which can also be violent – coercion (e.g., abduction, arbitrary confiscation of property, control of the media, disappearance, torture, unequal application of the law). It is not possible for a totalitarian government to attempt to take liberty away without exercising an extreme and direct level of coercion. The exercise of coercion can be complemented and augmented by designing institutions that are explicitly directed towards the direct fulfillment of the totalitarian objectives. In brief, under totalitarianism liberty and coercion are entangled to the extent that the latter constantly tries to fully suppress the former by any means necessary.

Conversely, a liberal democracy tries to ensure that ordinary people have the liberty to go about their life as they choose to so long as the going about does not interfere with the life of others. To do so, coercion is not absent. But it mainly manifests indirectly, non-violently and minimally – through rules rather than discretion (e.g., court sentence, regulation, taxes, the exclusion characteristic of property rights). It is not possible for a democratic government to ensure liberty without exercising coercion, however minimal – this entanglement is exercised, in the ordinary course of events, mostly through rules rather than discretion.

We therefore see that coercion is the tool in a government's arsenal that can determine the extent of liberty *and not vice versa*. In the entanglement, muscles dominate sentiment. But whereas in a polity coercion is employed to permit liberty, in totalitarianism coercion is employed to not permit liberty.

So, in a polity, institutions intended as rules of the game that instruct, rather than command, action and behavior are always present. In this sense, we can assert that they are *absolute.* However, they are not absolute in their nature. If needed, rules can be reformed through the constructive exchange of views. Moreover, they can vary across polities. Think about the presence of varieties of democracy throughout the world (https://www.v-dem.net/). Rules can also more generally vary within a society over time. For instance, after the fall of the Berlin wall many East European countries began their polity path through the reform of their fundamental public institutions. Thus, the options and constraints from rules are only *relatively* absolute; their nature can, to appropriate a famous phrase by Hayek (1945) from a different but related context, vary according to time as well as within and across places. Rules are therefore "relatively absolute absolutes" (Knight 1982[1947]; Simons 1948; Buchanan 1999c [1989]). The substantive implication is that liberty is a spectrum: the institutions of different polities can permit different levels of liberty.

This more realistic perspective from the three Hayekian points that entails the existence "of the state" and its attendant public institutions, such as "the rule of law" (Kelly 2013[1982]: xv), under liberalism leads to the following pragmatic inference: the problem of maximizing liberty is in actual fact significantly less practicable than direct modeling would suggest. The mathematics remain elegant, logical and sensible. But the socioeconomic aspects of the problem obviously

would not remain so because their greater realisticness introduces added complexities, such as the non-separability of liberty from coercion, but also the greater slipperiness or intangibility of liberty as such.

The recognition that solving a social problem is not always equivalent to solving a mathematical problem (and vice versa) (Nelson 2011) means that we have lost the primal side of duality. This failure of the primal is sufficient to also claim the failure of duality as a whole for liberty and coercion. And yet it does not mean that the dual problem of coercion minimization fails too. If one reflects on the dual, in fact, matters are more promising. Minimizing coercion is a more tractable problem. Unlike liberty, coercion is a control variable that can be more directly influenced by policy conjectures that are either qualitative (e.g., civil code, political regime) or quantitative (e.g., an equalization grant, majority level for collective decision making). In other words, the dual rests on institutions.

Duality hence predicts maximizing liberty and minimizing coercion to be the same mathematical problem. But this prediction does not extend to practical or, if you prefer, more realistic social science applications. For what we know to have currently at our disposal are institutions that minimize coercion, which we identify theoretically with the dual of duality. In part, these institutions emerge and evolve without any conscious planning; in part they are designed and change through our direct volition and interactions.

Although Hayek would utter more than just a word of caution about institutional design, Constitutional Political Economy and entangled political economy are, relatively speaking, more pragmatic, albeit still prudent. Some institutional design is considered to be feasible, and it is also actually what goes on all the time in the entangled real world. In contemplating the possibility of maximizing liberty in the early stages of his career, Buchanan, for example, went so far as to suggest that liberty existed only in the absence of coercion. However, as his career progressed, he came to realize the impracticality and possibly even the naïveté of the very idea. In fact, Buchanan's view eventually morphed into the more realistic understanding that a minimum amount of public coercion in the form of a constitution – that rule of the game to which other rules ought to, by definition, conform to – is necessary to maximize liberty. An understanding that later became the foundation of Constitutional Political Economy (Fleury and Marciano 2018).

This does not mean that institutional design is perfect. Indeed, quite the opposite is the case: given our limited knowledge, all real-world institutions can be considered imperfect.[5] But differently from Constitutional Political Economy, entangled political economy embraces complexity, which, we saw, renders it open-ended as well. This entails that there is – for both entrepreneurs and politicians, whatever the motivation of the latter may be (e.g., Brennan 2008) – room for evolutionary trial-and-error learning that can, in some circumstances, make matters a bit less imperfect (Garzarelli and Keeton 2018).

A more general observation follows. For the protection of liberalism Public Choice too does not rule out the feasibility of some institutional design. But, differently from Public Choice, entangled political economy suggests that institutional design should not be performed just with the reduction of waste in mind; that is, with emphasizing Public Choice's minimization of rent seeking. It should also be performed – perhaps above all – with emphasis on the conditions that permit the release of the productive energies of ordinary people. It is in fact these productive energies that, through an entrepreneurial spirit that strives for, and drives, innovation, create value in an economy. Markets thrive on this spirit.

This is an appropriate moment to point out that it is also improbable to completely suppress liberty. The

> *elimination of all spontaneity within a situation of subordination is in reality considerably less common than the freely offered popular expressions suggest with such notions as 'coercion,' 'having no-choice,' 'absolute necessity.' Even in the most oppressive and cruel relations of subjugation there always yet remains a substantial measure of personal freedom. … Precisely viewed, the relationship of dominance and subordination annihilates the freedom of the subjugated only in the case of direct physical coercion; otherwise it tends simply to demand a price we are not typically inclined to pay for the realization of freedom (Simmel 2009[1908]: 130).*

The upshot is that liberty and coercion are themselves entangled, not crisply divisible as figures 4 and 5 suggest. From a modeling perspective, this leads to a dependency rather than to a duality. The increased realisticness of entangled political economy suggests that liberty ought not to be regarded as separable from coercion. Rather, liberty should be seen as the complementary opposite of coercion. That is to say that in a polity liberty is better interpreted as a function of the variable that we have comparatively more control over – viz., coercion.

See the stylized representation in Figure 6. Notice how in a polity the liberty-coercion complementarity relation defines liberty in terms of the extent of coercion. When there is no coercion, there is no liberty. In contrast to the prediction from duality where one can conceivably have maximum liberty without any coercion, it is coercion that permits liberty. Accordingly, coercion is always positive in its amount. This autonomous component of coercion entails that the origin is outside the feasible set.

The maximum level of liberty $-L^*-$ is obtained when coercion reaches $\bar{C}$, which is that natural, or, as Wagner would say, that "proper" level of coercion that renders liberty sustainable. Before $\bar{C}$, the amount of coercion is insufficient to sustain liberty. As coercion increases beyond $\bar{C}$, liberty can be quickly eroded. However, à la Simmel, it is not necessarily completely lost. Hence, the *x*-asymptotic portion of the relation.
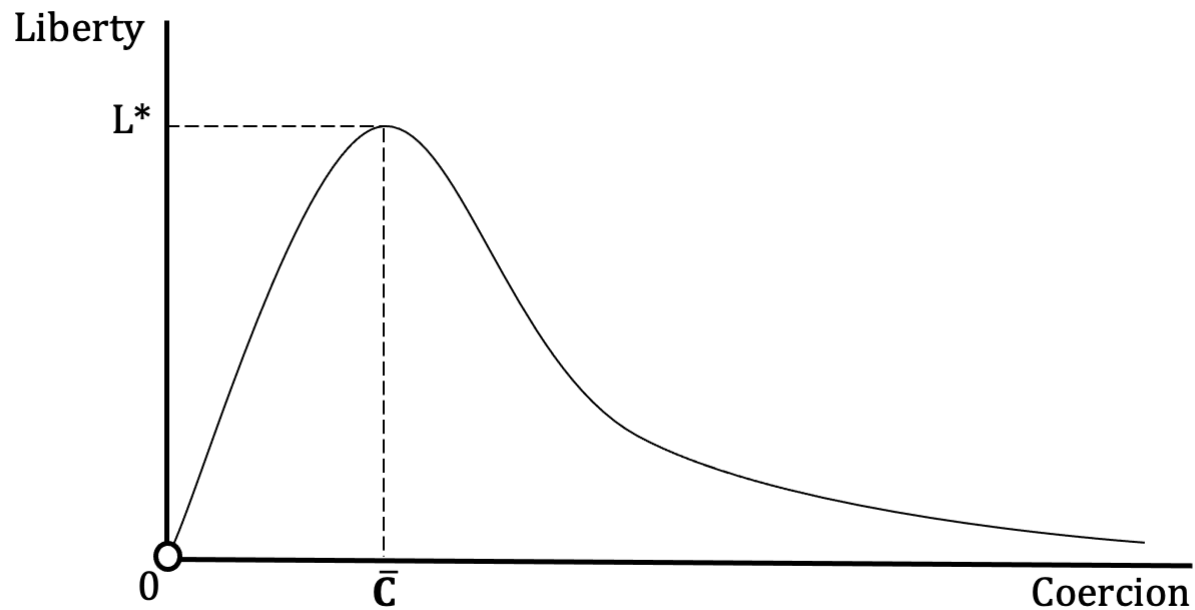
Figure 6. Liberty and Coercion in a Polity

Clearly, $\bar{C}$ is not absolute. It is polity-relative. Its amount can vary from polity to polity. This assertion that a polity protects liberalism by permitting liberty through its own sui generis $\bar{C}$ does not entail that the protection is flawless or perpetual. It simply means that it is the extant protection. As a matter of fact, $\bar{C}$ would only exceptionally be the outcome of a well-defined maximization problem. $\bar{C}$ is more often the result of immanent conjectures that accumulate over time. We can imagine that at time zero a polity would have its constitution (or equivalent document) as the primitive conjecture that results from compromises among individuals within and between economic and political spheres from which all other policy conjectures would follow. The post-constitutional policy conjectures (also from give and take within and between economic and political spheres) that prove successful would then over time coalesce into the public institutions that add to the formation of the autonomous component of coercion; while the unsuccessful conjectures will instead dissolve away, subtracting from the autonomous component. Both processes evolve blindly and are likely to be at play simultaneously.

This conception also implies that $\bar{C}$ can – and usually will – change through time. In the ordinary course of events, changes in $\bar{C}$ will be gradual (e.g., a reform in electoral rules). But when non-ordinary events crop up, $\bar{C}$ can change quickly, non-gradually and by direct intervention. Think about how during the COVID-19 pandemic most polities increased $\bar{C}$ through lockdown and other fiat policy measures (e.g., mandatory mask wearing) to attempt to contain contagions; and how this change was tied to the duration of the exceptional circumstance.[6]

However, a polity can also manifest episodes of degenerate coercion. For example, Hungary employed the COVID-19 pandemic to take a more autocratic turn. Whether today Hungary is still a polity as a result of the increased coercion remains an open question. There can also be degenerate violent coercion in the ordinary course of events. Police brutality in the United States comes to mind. More generally, if history is anything to go by (e.g., North, Wallis and Weingast 2009),

the conception of $\bar{C}$ as in most cases being the entangled result of a non-teleological evolutionary process is arguably not unfounded.

5. Discussion

Within the additive political economy framework, the problem of maximizing liberty and the problem of minimizing coercion are dual to each other. Hence, the problem one solves is a question of convenience because both are practicable. Issues are different in the more realistic theoretical framework of entangled political economy. Within entangled political economy, the problem of maximizing liberty is less practicable than direct modeling would suggest because in a polity liberty is maintained through coercion. This makes liberty and coercion entangled, not additive. Liberty does not limit coercion. Institutions do, notwithstanding their imperfect nature. Thus, while duality predicts maximizing liberty and minimizing coercion to be the same problem, this prediction does not extend to the protection of liberalism under entangled political economy.

In fact, with its emphasis on the non-separability of liberty and coercion, entangled political economy points out that liberalism does not emerge from the positive liberty that income permits to ordinary people, as predicted by duality in additive political economy. As entangled political economy explains, liberalism emerges from the negative liberty that the rules of the game permit to ordinary people to equally flourish – without them physically coercing each other (e.g., Berlin 2002[1969]: 169; McCloskey 2016; Infantino 2020). Hence, there is the primacy of negative liberty over the positive. At the same time, entanglement suggests that for the protection of liberalism we ought to consider positive and negative liberty also as themselves being entangled. For such entanglement defines the open-ended nature of choice. As Hayek (2013b [1960]: 69-70) writes, it

> is often objected that our concept of liberty is merely negative. … This is true in the sense that peace is also a negative concept or that security or quiet or the absence of any particular impediment or evil is negative. It is to this class of concepts that liberty belongs: it describes the absence of a particular obstacle – coercion by other men. It becomes positive only through what we make of it. It does not assure us of any particular opportunities, but leaves it to us to decide what use we shall make of the circumstances in which we find ourselves.

Perhaps a portmanteau for the entanglement of positive and negative liberty in a polity can be simply the earlier notion of civil liberty.

The open-endedness of entangled political economy can still retain rigor in ways we still need to discover. At this point evolutionary concepts seem to be most helpful, but only time will tell. In terms of a normative result, a fundamental lesson is that the protection of liberalism is a work in progress, because changes in coercion always occur in the entangled real world. Our job is therefore to stay vigilant.

As a young theory, the success of entangled political economy revolves around growing the community of scholars that

actively contribute to it as a positive research program (Lakatos 1989[1978]). How this can be achieved is a sociological question. Previous successful examples ought to be emulated. We need to use all the tools at our disposal for building and growing the invisible college: research groups at universities, seminars, professional organizations, and publication outlets (Hodgson 2022; Snyder 2004). The success of Public Choice in the 1960s and 1970s provides an example that can be replicated. Besides the oft-cited leaderships of James Buchanan and Gordon Tullock, the expansion of Public Choice owes also to research groups (initially at Virginia Tech), the founding of the journal *Public Choice* (formerly *Papers on Nonmarket Decision Making*), and visiting scholars and graduate students programs (Medema 2004; Wagner 2004). The Entangled Political Economy Research Network represents an important initiative in this sense (https://www.entangledpoliticaleconomy.org/). And, with the growth of the field in mind, scholars seeking to contribute to entangled political economy may also consider the recently relaunched *Journal of Public Finance and Public Choice* as a possible outlet.

We are grateful to Richard E. Wagner, the founder of entangled political economy, who has set us on a new path of discovery.

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Declaration of Interest

The authors declare that they have no relevant or material financial interests that relate to the research presented in this work.

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Appendix

Consider a society of N individuals indexed by $i = 1, \ldots, N$. There is a bundle of publicly provided goods $G^i = g^i_1, \ldots, g^i_N \in R^N_+$ providing some standard of living $U^i(G^i) \in R^N_+$. Let $U^i\left(G^i\right)$ measure the level of liberty. Each

individual i has an income $Y^i \in R_+^N$ and faces a vector of tax prices $T^i = t_1^i, ..., t_N^i \in R_+^N$ for G^i. Each individual i aims to

$$\max_{G} U^i\left(G^i\right) \quad \text{s.t.} \quad \tau^i G^i = Y^i, \qquad (1)$$

where τ^i is the transpose of T^i, $\tau^i G^i = Y^i$ is the coercion constraint, and $g_j^i = \dfrac{Y^i}{t_j^i} - \Sigma \dfrac{t_{k \neq j}^i}{t_j^i}$ is the coercion line. The tax t_j^i is a measure of coercion: an increase in t_j^i increases coercion. An increase in t_j^i decreases g_j^i, G^i, and $U^i(G^i)$. That is to say that an increase in coercion decreases liberty.

The solution to (1) is:

$$G^i = G^i(\tau^i, Y^i). \qquad (2)$$

In (2) we have that, for individual i, the optimal quantity of a bundle of publicly provided goods G^i depends on a vector of tax prices τ^i and income Y^i.

Using (1) and (2), we get i's maximum obtainable liberty, U^{i*}, as follows:

$$U^{i*} = U^{i*}[G^i\left(\tau^i, Y^i\right)] = V^i(\tau^i, Y^i). \qquad (3)$$

Dual to (1) is the following minimization problem:

$$\min_{G} \tau^i G^i = Y^i \quad \text{s.t.} \quad U^i\left(G^i\right) = U^{i*}. \qquad (4)$$

The solution to (4) is:

$$G^{i\#} = G^{i\#}\left(\tau^i, U^{i*}\right) \qquad (5)$$

In (5) we have individual i's optimal quantity of publicly provided goods $G^{i\#}$ stated in terms of the vector of tax prices τ^i and the maximum attainable liberty U^{i*}.

Using (4) and (5) we get the minimum coercion constraint that i needs to obtain U^{i*}:

$$\tau^i G^{i\#} = \tau^i G^{i\#}(\tau^i, U^{i*}) = Y^i(\tau^i, U^{i*}). \qquad (6)$$

Using (3) and (5), we have duality as follows:

$$G^{i\#}(\tau^i, U^{i*}) = G^{i\#}[\tau^i, V^i\left(\tau^i, Y^i\right)] = G^i(\tau^i, Y^i) = G^{i*}. \qquad (7)$$

Footnotes

[1] In economics, the idea of duality started with Antonelli's introduction of the indirect utility function in 1886, although the equality between the indirect utility function and the direct utility function was established only four decades later, in 1926,

by Konyus and Byushgens. The duality between the indirect utility function and the direct utility function was based on Minkowski's 1911 theorem in mathematics. Minkowski's theorem established the duality between a closed convex set and its supporting halfspaces (Diewert 1987). This idea that there is more than one way to describe a convex set – i.e., Minkowski's theorem – has been applied to various other dual relationships in economics. To take some well-known examples, especially in microeconomic analysis, the profit function and the cost function (Rosas and Lence 2019), the input distance function and the cost function, and the output distance function and the revenue function (Fare and Primont 2006; Pastor and Aparicio 2010) are all dual halfspace descriptions of a firm's technology choice set.

[2] The clause "for the most part" is important in this sentence. There are exceptions in terms of private institutions of coercion (e.g., Leeson 2007; Stringham 2015).

[3] In the state of nature with the presence of private coercion, people can be divided into two groups: the coercers and the coerced. In moving towards civil society with some measure of public coercion, it is more obvious that the coerced would be in favor of public coercion as it offers protection from the coercers. The willingness of the coercers to accept public coercion is less obvious. Pantaleoni (1898) suggests that coercers recognize that their position is fickle, e.g., a coercer who displays physical strength will lose that advantage as he ages. With this recognition, coercers, like the coerced, are willing to accept public coercion as a type of insurance against the loss of their ability to coerce.

[4] Here we concentrate on the second half of the Laffer curve where an increase in the tax price (rate) decreases total taxes. This is where the coercion constraint becomes meaningful. The individual pays more in taxes than she expects to get in terms of publicly provided goods.

[5] This does not mean that they are inefficient. As long as we do not learn about feasible alternatives that are less imperfect and that can replace the institutions that we live under at a net benefit, the institutions that we observe can be considered efficient – of course, this is in relative, not absolute terms. Leeson (2020) makes essentially the same claim starting from a different, but still related, institutional perspective.

[6] Lockdowns and similar ephemeral suspensions of democracy (e.g., curfews) through more direct coercive policies because of an emergency are something that Hayek (2013a[1973]: 458-459) and Rawls (1999: 55) can, *mutatis mutandis*, be found to agree on. The point is also found in one of the classic inspirations for both, namely Locke (1999[1690]: 375). See also Cowen (2021) and Garzarelli, Keeton and Sitoe (2022).

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