

# **Do Adaptation and Selection Affect the Survival of Public Organizations?**

## **An Empirical Analysis of US Federal Independent Agencies**

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### ABSTRACT:

Why do some public organizations survive for decades, whereas others are terminated within years? Ever since Herbert Kaufman first posed the question, organizational survival continues to inspire research. This article explores two possible yet opposing answers that are often suggested in the literature. Organization and public administration scholars agree that public agencies must adapt to stay alive. Population ecologists, in contrast, argue that adaptation does not matter; environmental selection determines survival, they claim. In fact, they argue that structural inertia – the absence of adaptation – enhances the likelihood of survival. In this article, we test these contrasting claims (while controlling for design features) on a population of US federal independent public agencies ( $n = 142$ ). Our findings suggest a subtle narrative. Adaption, surprisingly, does not appear to play a significant role, one way or another. Selection does seem to matter, especially during an organization's period of adolescence.

## **Why do Public Organizations Survive (or not)?**

Government often addresses new or persistent problems through the creation of an organization. It is through these (semi)public organizations that government seeks to accomplish its ideals – and it is through these same organizations that ideals get perverted (Selznick 1957; cf. Boin and Goodin 2007).

Scholars of public administration and political science have long debated how these organizations should be governed and controlled. As long as public organizations serve and reflect widely shared societal values, there is no problem. But when societal shifts demand but not beget organizational responsiveness and adaptation, institutional tensions are sure to emerge. From a pure functional perspective, one would expect persistently ‘recalcitrant’ organizations to be terminated at some point. But, as Herbert Kaufman (1976) famously noted, many public organizations seem immortal. This prompts the question: why do organizations survive or die?

In his pioneering and mostly descriptive study, Kaufman (1976) found that a mere 15 per cent of the federal agencies that existed in 1923 had disappeared in 1973. Some became ‘institutional dinosaurs’, shaping societal ideals over long stretches of time. But when David Lewis (2003) studied a population of federal organizations over the period 1946-1997, he found that only 40% of the 426 organizations in his sample had survived this period of time.<sup>1</sup>

In his large-scale study of federal US agencies, David Lewis (2002; 2003) argues that both organizational termination and survival are a function of institutional design

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<sup>1</sup> Whereas Kaufman may have been somewhat conservative in his selection, Lewis adopted criteria that may have biased his findings toward a higher mortality rate. Lewis, for instance, coded a combination of name and function change as an organizational death, whereas Kaufman spoke of organizational death only when the “boundaries around a group” had disappeared.

(cf. Carpenter and Lewis 2004). Drawing on the work of Terry Moe, Lewis hypothesized that certain structural features—such as policy insulation, a specific organizational structure, and statutory recognition—might affect survival chances. Indeed, he found that properly ‘hardwired’ organizations lived longer. His findings suggest that institutional birth features matter more than, for instance, performance.

But there are other possible explanations for durability. From the field of organization theory, where the fate of organizations has long been researched, two other contenders emerge: adaptation and selection (cf. Perrow 1986; Aldrich 2008).

In the fields of public administration and organization theory, many scholars believe that *adaptation* plays a large role in explaining survival. Adaptation logic emphasizes the role of fit-enhancing change implemented by individual organizations. To preserve a life-sustaining fit with its environment, an organization needs to adapt. A failure to adapt will lead to an organization’s eventual yet inevitable demise (cf. Fukuyama 2014).

In organization theory, the prominent organizational ecology school studies the survival of entire populations of organizations, as well as of individual organizations within populations. This school accords a large role to *density* and *competition*. The idea is that environmental shifts will make certain organizational types or forms obsolete. These scholars admit that adaptation might help an organization to survive, but this school argues that such ‘deep’ adaptation is impossible (efforts to do so will only make survival less likely). An organization’s demise is caused by forces that lay beyond its reach, or so the argument goes (see Bogaert et al. 2014, for a recent example).

These explanations are, of course not paradigmatically homogeneous and may be complementary.<sup>2</sup> But these explanations are rarely discussed in conjunction or tested against the same population. More specifically, we are not aware of any study that systematically examines both perspectives in the context of a population of public organizations.

In this article, we will test the explanatory power of adaptation and selection, while controlling for institutional design; we do so in a population of US federal independent agencies. We start by summarizing these key explanations, after which we will explain how we gathered data on this particular population. Subsequently, we will estimate a model that, in its core, has elements reflecting both explanations of organizational survival. After discussing our findings, we will contemplate what these findings may mean for the research on the survival of public organizations.

## **2. Adaptation versus selection: Towards hypotheses**

### ***Adaptation***

Many studies in organizational sociology and public administration suggest if not assume that only those organizations that continuously, and proactively, adapt in response to changes in their environment can stay alive (Drazin and Van de Ven 1985; Parker and Van Witteloostuijn 2010). Organizational survival, then, is considered a function of the capacity to implement appropriate changes in policy, personnel or

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<sup>2</sup> Lewis (2004), for instance, found that congruence between an organization's performance and Congressional preferences (gauged in terms of the legislative median's ideal point) has a substantial and significant impact on agency survival. He thus accepts that the forces of adaptation operate after the public organizations' initial design has been implemented.

processes to restore or maintain a fit with the ever-changing expectations and values of key audiences (Aldrich 1999; Kaufman 1981; March 1991; Selznick 1957; Wilson 1989).

The underlying assumption is that organizations require a minimal degree of explicit and implicit support from key stakeholders; without the support of such stakeholders, organizations cannot attract the resources required to survive. This support is usually conceptualized in terms of legitimacy (Suchman 1995). The level of support can be measured in terms of (changing) budgets, political and media attention, and imposed reform (Baumgartner and Jones 1993; Boin and 't Hart 2000).

The key argument here is that when public organizations do not change in anticipation or response to what happens in their environment, they will eventually lose the support from their key constituents or stakeholders. This loss of support typically becomes manifest in the form of an institutional crisis: an episode of negative media attention that focuses on a seemingly random incident, which is framed as an indicator of structural and avoidable failure of the public organization at hand (Alink et al. 2001; Boin and 't Hart 2000). Such an institutional crisis enhances the chances of imposed change (reform), or even termination. In fact, some authors argue that organizations can only change in the face of (or in reaction to) crises (Brunsson and Olsen 1993; Hermann 1963). In the words of Crozier (1964, 196), "Crisis provides the only means of making necessary adjustments."

Adaptation is not an automatic or an easy process. It is hard to change institutionalized features of an organization, as they contain and build upon proven success formulas. Employees in successful organizations rarely see the need to change established practices or structures. This reluctance is enforced by a more general

resistance to change common to most people (Argyris 1993; Sorge and Van Witteloostuijn 2004).

But adaptation does happen. It comes in different forms and shapes. It can be proactive (anticipating the perceived need to change) or reactive (after a crisis or following the direct orders of stakeholders); it can come in small steps (incremental change) or in a comprehensive radical reform program leading to paradigmatic change (Baumgartner and Jones 1993; Tushman et al. 1986).

Many scholars recognize a hierarchy of adaptation (see, e.g. Genschel 1997; Lindner and Rittberger 2003), ranging from the least pervasive and fairly routine adjustments to structural reform of the organization's mission and *raison d'être*. Baumgartner and Jones (1993) differentiate between incremental and paradigmatic change, whereas Sabatier (1988) talks about the policy core and secondary aspects. Hannan and Freeman (1984, 156) distinguish between four types of change: pertaining to the marketing strategy, technology, forms of authority, and stated goals.

In this article, we adhere to Hall's (1993) distinction between first, second and third-order adaptation or change.<sup>3</sup> First-order change consists of routine adjustments of existing instruments and ways of working. This is relatively easy and happens all the time. Second-order change pertains to a change in instruments, process and structures. This is a more fundamental change and difficult to achieve. Third-order change refers to a change of thinking about goals and ways to achieve goals – Hall speaks of “paradigmatic change”. This is the most fundamental and rigorous form of adaptation. In our empirical analysis, we will concentrate on third-order adaptation because change of its core arguably has most impact on the organization, and, therefore, on its survival

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<sup>3</sup> These categories are, by and large, equivalent to Hannan and Freeman's steps from periphery to core.

chances. If any impact of adaptation is to be observed, it is most likely to be observed for changes to an organization's core.

### ***Selection***

The ecology school is a prominent perspective in organization theory (Perrow, 1986). It has paid much attention to the question of organizational survival. Organizational ecology does not deny the importance of adaptation, but assumes that individual organizations are "structurally inert" – meaning that they rarely have the capacity to make meaningful adaptations (Aldrich 1999: 43-48). The focus is subsequently on shifts and shocks in the environment, which create mismatches between the organization and its environment. Just like an environmental shock (a meteorite) can destroy the habitats of certain species (dinosaurs), emerging mismatches work as selection forces on a population of organization types, benefitting some while disadvantaging others. Selection rather than adaptation is thus, according to the ecology argument, key to understanding how populations of organizations evolve and die (Hannan and Freeman 1977). By and large, the argumentation underlying this theory unfolds in four steps.

The first step is to argue that organizations tend to reveal structural inertia in the face of changing environments. Organizations have, for a variety of reasons, difficulty to really change. This is not to say that organizations do not change – they do. But most of the time, they do so superficially (enacting first-order changes); they rarely adapt their core (third-order change). Looking at process costs helps to understand why it is difficult to achieve change (Barnett and Carroll 1995). The process of developing and implementing change always incurs transaction costs. Given these costs, a change will only work out well if the benefits of the change are large enough. Ecology's expectation

is that the likelihood of successful transformation drops substantially as one proceeds up the hierarchy from first to third-order change.

The second step introduces the notion of relative inertia, which holds that changes in the environment outpace those initiated by the organizations in this environment (Kelly and Amburgey 1991). Ecologists assume that even if organizations succeed in bringing about fundamental (or core) change, it will be either too late or the change will not suffice. Adequate adaptation is hindered by the large uncertainty associated with diagnosing the right change (Péli 1997). The organizational change literature provides support for this notion, as anywhere between two-thirds and three-quarters of change initiatives in the business world turn out to be a failure (Sorge and van Witteloostuijn 2004).

It logically (and intriguingly) follows in a third step that organizational inertia is a condition that favors the likelihood of survival – a thought-provoking claim indeed (Amburgey et al 1993; Hannan and Freeman 1984). Stakeholders, from customers to politicians, expect organizations – private and public – to be accountable, reliable and consistent, and hence to stay true to their identity and their legally sanctioned modus operandi. Constant adaptation would undermine these essential characteristics, hence harming the prospect of survival. Inert organizations are thus, on average, more likely to survive than their ever-adapting counterparts.

The fourth and final step in the ecological chain of reasoning brings in selection. Given that individual organizations are unlikely to adapt effectively, it makes sense for ecology theorists to concentrate on the level of organizational populations. After all, if the observed change and variety in the organizational landscape does not result from individual organizations flexibly adapting to their environment, then they can only



result from the selective replacement of individual organizations within populations (the birth of new types of organizations and the exit of others). Ecology's theory of selection builds on the idea of "density dependence" (Hannan and Freeman 1989). Density is the sum count of the number of organizations that operate in any given population. In an emerging population, density has a positive effect on the legitimation of the new organizational form. The selection effect of density on entry is positive (encouraging similar organizations to enter the market); it has a negative effect on exit. In maturing populations, however, the density effect is reversed. More and more organizations have to compete in a limited market and over limited resources. The density effect on entry becomes negative, and positive on exit. The density dependence effect when measured over time can be depicted in the form of a U shape (regarding entry rates) and a hill shape (exit rates). Ecologists would naturally expect to see a similar depiction for a population of federal agencies.

At first sight, it would seem that this theory has little explanatory value for our population. After all, the organizations in our population do not produce similar goods or services. And these organizations do not operate in a market environment, as most organizations studied by ecology theorists do. It is important to recognize, however, that organizational ecology's concept of competition – or selection, for that matter – is much broader than traditionally envisioned in the classic economic theory of market competition. Ecologists define competition as the struggle to capture a viable share from the pie of any type of scarce resources.

Organizational ecologists would thus argue that government-controlled public organizations fight for scarce resources in the form of, for instance, support from policymakers or government budgets. Without such resources, public organizations are

very likely to be selected out, with termination as the ultimate consequence.<sup>4</sup> The example of the ecology of political parties illustrates this logic (Lowery et al. 2011, 2013). Political parties are not like private enterprises competing for customers in the marketplace, but they are rather organizations fighting for their share of votes in an electoral space. A similar logic has been fruitfully applied to interest groups (Gray and Lowery 1999; Lowery et al. 2012), national laws (Kaufmann and Van Witteloostuijn 2013; Van Witteloostuijn and de Jong 2010) and state-owned enterprises (Zhou and Van Witteloostuijn 2010).

### ***Towards hypotheses***

We are interested in the question whether adaptation and selection can help to explain the fate of public organizations. The scholarly traditions introduced above provide us with two very different explanations of organizational survival in the public sector. In the remainder of this article, we let the data speak. By way of stepping stone, we develop two sets of alternative hypotheses:

*H1: A public organization's adaptation of its core (i.e., mission statement) is positively associated with its likelihood of survival.*

*H1alt: A public organization's adaptation of its core (i.e., mission statement) is negatively associated with its likelihood of survival.*

*H2: The density of a population of public organizations will not affect a public organization's likelihood of survival.*

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<sup>4</sup> This logic mixes competition with carrying capacity arguments. We will introduce the carrying capacity concept in greater detail below.

*H2alt: The density of a population of public organizations will non-monotonically affect a public organization's likelihood of survival.*

Note that, in principle, our empirical analyses may produce two other sets of results. First, we might find both adaptation (H1) and selection (H2alt) are at work. If so, this would imply that the theory of evolutionary economics can be sensibly applied to understand the fate of public organizations and the evolution of their populations. Second, we may find that neither adaptation (H1alt) nor selection (H2) has any effect. We then have a population in stasis.

### **3. Research design**

To explore the effects of both adaptation and selection on the survival of government organizations, while controlling for design effects, we constructed an extensive dataset of the population of US federal public agencies that are listed in the US Government Manual (USGM) during the period 1935-2011 as 'independent agency' for at least one year of their existence.<sup>5</sup> All these agencies have their own 'entry' (section) in the US Government Manual, usually containing valuable information that allows us to collect, code and compare sufficient data on those agencies. These organizations have in common a degree of insulation from executive interference (as opposed to cabinet bureaus) (see Lewis 2003, 10-11).

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<sup>5</sup> For reasons of size, organizational unity and distinctiveness, we excluded: (a) bilateral or multilateral organizations; (b) monuments, celebrations (e.g., bicentennials) and commissions; (c) foreign claims commissions; (d) committees, advisory councils or boards consisting of only *ex officio* members (such as the Secretary of Defense and State together advising the president as "Council X or Y") or functionaries or representatives of other organizations, which do not form a standing organization; and (e) agencies with only a single state purpose (e.g., Delaware River Basin Commission, Virginia State Boundary Commission, and Alaska Power Administration).

In a study of organizational survival, the definition of the focal population is essential (Carroll and Hannan 2000). Shared characteristics are critical for any definition of an organizational form that operates within the boundaries of a distinctive population, being potentially subject to common forces of selection (cf. Bogaert et al. 2014). The independent status of the agencies implies an important similarity in an otherwise heterogeneous population (in terms of mission, sector, clientele, *et cetera*). Moreover, these agencies compete for the same set of scarce resources, such as political support and government budget. We excluded cabinet bureaus because their dependence on the whims of executives is itself an explanatory factor for survival.<sup>6</sup> Neither can agency components and sub-offices be included, as by their very nature they perish much more easily and frequently than the independent agencies they are part of.<sup>7</sup>

### ***Sample***

Our population consists of 142 US federal independent agencies. Sixty-eight of those agencies still existed on December 31, 2011.<sup>8</sup> These survivors (48 % of the total) imply right censorship, which means that the outcome in terms of survival is yet unknown. Right censorship is common in any ecological survival analysis, which can be corrected for by using tailor-made statistical techniques (see below). The 20 cases (14 %) that were established before 1933 (we assumed that the 1935 USGM covers reliably all

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<sup>6</sup> A close look at Lewis's 2003 dataset reveals that 185 of Lewis's 291 non-independent agencies were terminated (65 %), whereas only 53 of Lewis's 148 independent agencies were terminated (35 %). This finding instructs us to look at the most similar subset only, as we are studying different explanations for survival than Lewis did.

<sup>7</sup> Of Lewis's independent administrations (code 3), 53 perished—43 of those were agency components (81 %). Yet 23 of the independent code 3 cases survived; only 8 of those were agency components (35 %).

<sup>8</sup> Due to unavailability of data for 2012/3, we decided to take 31 December 2011 as an artificial end point.

information from 1933 onwards) are left-censored. Only three agencies date from before the 20<sup>th</sup> century—the oldest being the US Postal Service, created in 1789.

Left-censorship may bias the results since “some organizations may enter the time period with long and successful histories, other may be fledging organizations founded in controversy, and yet others may be ‘dinosaurs’ which have outlived their usefulness” (Peters and Hogwood 1991, 88). We chose to also collect data on these agencies in order to be able to explore explicitly whether or not the inclusion of these cases in our population does indeed introduce substantial error. We traced all agencies for every year of their existence since 1935, or since their creation to overcome middle-censorship problems (due to information lacking on events occurring between two points in time).

Defining creation and termination of organizations is no easy task. We kept our definitions as closely as possible to those of scholars who struggled with the same challenge before us (e.g., Carroll and Delacroix 1982; Lewis 2002, 2003; MacCarthaigh 2014; Maijor et al. 1995; Meyer 1985; Pennings et al. 1998; Rolland and Roness 2011). We consider organizations terminated when they are explicitly mentioned as terminated or abolished in the USGM (and there is no indication of continuity beyond this official termination), split into two or more new organizations (secession), absorbed into another office, or merged with another office. A merger or secession indicates the birth of one or more new agencies (Boin et al. 2010, 390). We consider an organization terminated and replaced by a new agency when it has a new name, a new organization structure, tasks different from a possible predecessor, and new leadership (ibid, 390).<sup>9</sup>

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<sup>9</sup> Here we depart from Lewis (2003), who considered an organization “new” if it had a new name, new location (for instance, transferred to a cabinet department) or different functions from any previously existing agencies. The criteria used by Lewis result in more creations and terminations. Using his criteria,

Following Lewis' (2003) pioneering work on the effects of institutional design, we recorded birth characteristics such as governing structure of the agency (single administrator versus governing board), sunset clauses, and legislative origin based on the first entries of the agency in the USGM, as these are needed to construct essential control variables (see below).

In line with organizational ecology's theory of (relative and structural) inertia (Hannan and Freeman 1984; Hannan et al. 2007), we argue that mission change is an appropriate indicator of an organization's adaptive behavior. After all, as explained above, ecologists believe that organizations cannot easily make timely and successful changes to the core. If they can change their mission, part of the organization's core and thus hard to change, we have a solid indicator of adaptation. For each year after 1935, we used US Government Manual information on each US federal independent agency to trace and register annual mission changes to have data to create core adaptation measures (see below). We also consulted the Federal Register to code budget appropriations for each year of an agency's existence.

## **4. Method**

### ***Model estimation***

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the life span of, for instance, the National Archives and Records Administration would have added an extra creation and termination to our dataset (the same goes for the Social Security Administration). In our view, the creation of the National Archives and Records Service (NARS) in 1949 did not qualify as a new organization, because we see a strong continuity of the National Archives as established in 1934 (McCoy, 1978). Wayne Grover remained the leader of the NARS. The organization remained in the same building, with the same staff. Because agencies change names and location in the government structure quite frequently, interpreting such changes as abolishment would bias our results in favor of termination and against durability.

We apply event-history analysis (Tuma and Hannan 1984) at the level of the independent federal agency to estimate the likelihood of an agency being terminated in a given year. We utilize a piecewise constant exponential hazard specification. In a piecewise specification, the likelihood of failure is allowed to vary between age segments, but is constant within each segment. The advantage of piecewise specification over parametric specifications is that it does not impose any functional form on the relation between agency age and the hazard of failure. The piecewise constant exponential model has the following general form:

$$\mu(u)=exp(\alpha_p + \beta x_u) \quad p=1...P, \quad (1)$$

where  $\alpha$  is a constant that is allowed to vary between the age segments  $p$ , and  $\beta x_u$  is a row vector of coefficients ( $\beta$ ) and independent variables ( $x$ ). Exploration of the estimates revealed that a specification with breaks at years 3 and 9 was best able to capture the age dependence of the hazard, which gives the best statistical model fit. Moreover, to avoid issues of endogeneity, all independent and control variables are one-year lagged. The models are estimated using the *stpiece* function of the STATA statistical software package (Sørensen 1999).

### ***Model specification***

Our dependent variable follows immediately from equation (1): the likelihood of an agency being terminated in a given year. We coded an agency as terminated when the US Government Manual explicitly mentioned the agency being abolished, merged, split, or

replaced by a significantly different organization (see above).<sup>10</sup> We took the date specified by law or executive order (if available) as end date, and otherwise coded the date when the agency terminated its operations according to the USGM as termination date.

Our independent variables are adaptation and selection. Following earlier work in institutional theory and organizational ecology, we focus on mission change as an indicator of core adaptation. *Additions to mission statement* and *Removals from mission statement* are our key variables. Each USGM entry was examined for new purposes in, if available, a distinctly itemized mission statement, or in any of the following three subsections: 'creation and authority', 'purpose' and 'organization.' Each new purpose was counted as an addition to the mission statement upon its first appearance in a USGM entry for that agency in a given year. In many years and for many agencies, there are no additions to the mission statement at all, but in some cases two or three additions in the same year for the same agency could be found (we coded additions in absolute numbers). Similarly, regarding removals in mission statement, we coded the number of purposes (if any) that were removed from the mission statement when compared to the agency's mission statement of the previous year (in absolute numbers).

With regard to selection, we use the two density variables that are standard in (organizational) ecology: the *Number of agencies* and *Number of agencies squared*. This pair of variables is taken from figure 1's count of the number of US federal independent agencies that was operational in each and every year.

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<sup>10</sup> We took a sample of 20 cases from our population (representing both 'short lived' and durable agencies) and checked inter-coder reliability between the two researchers who did all the coding work. Out of 12,800 observations, we found 665 differences, which results in inter-coder reliability of 94.8 %. Each difference in observation (even if this pertained to only a fraction difference on a code scale) was interpreted most strictly, as full difference.



[Please insert Figure 1 here]

In our selection of control variables, we follow Lewis (2002, 2003). We recorded several agency birth characteristics, all extracted from the first entries of the agencies in USGM. To control for differences in governing structures, we differentiated between agencies that at time of birth were endowed with a *Board* or commission structure (coded 1), and those agencies that are not (coded 0). Each agency description in USGM commences with a listing of job titles in which board and commission members are mentioned in a separate section. Upon creation, agencies are regularly equipped with a commission or board structure, as opposed to a single administrator, with the intention to insulate them from incessant political interference (Lewis 2004).

Another design variable for which we control is the presence or absence of a *Sunset clause*, which is a provision that specifies when an organization will cease to exist, saving formal reauthorization. With a sunset clause, assigned a 1 code, creators give themselves the opportunity to revisit the original mandate and limit the lifespan of an agency. We scored any formal manifestation of transient intentions for the agency as the presence of a sunset clause. These included stipulations about a fixed budget for the entire lifespan, attainment of a specific goal or an official cutoff date. If none of these preconditions were mentioned in the first listing of USGM, we coded a 0.

The control variable *Weak legislative origin* was included in our model because the statutory underpinning of an agency forms the basis of its design. Agencies created after lengthy legislative procedures, involving heavy scrutiny and majority requirements, are thought to be less susceptible to termination than those agencies that

are forged by executive actions.<sup>11</sup> To determine to which extent the legislature was involved in the creation process of our population, we traced the inception mandates of each agency in the USGM and in the USGM's History of Agency Organizational Changes (2011). We coded agencies initiated by act with a 1 – having a 'strong legislative origin', those that had a reorganization plan at their basis with a 2, those established by an executive order with a 3, and those initiated by departmental or military order, which arguably could be classified as having the weakest legislative origin, with a code 4 (Boin et al. 2010).

We adapted Theodore Lowi's 1964 classification of policies to identify four agency types: (1) Distributive agencies distribute resources from the government to particular recipients, with the winners being concentrated but the losers (those who ultimately pay for the distribution) being diffuse; (2) Redistributive agencies transfer resources from one class or group to another; (3) Constituent agencies confer benefits or privileges aimed at diffuse groups or classes of targets, rather than individuals, or execute policies for the common good of all; and (4) Regulatory agencies execute policies aimed at groups or classes of targets, rather than individuals, and they typically raise costs for the targets (in which case the costs are concentrated). We collapsed the first two categories (distributive and redistributive) into one variable, referred to as *(Re)distributive agencies*, indicating whether an agency is primarily oriented at service delivery (coded 0) or benefit distribution to citizens (coded 1).

Additionally, the variable *After term creating president* indicates whether the term had been completed of the president under which the agency was created (1) or not (0) at the time of termination. Vice-presidents (such the first terms of Truman,

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<sup>11</sup> This hypothesis was confirmed by Lewis (2002) and Boin et al. (2010) in research on US federal agencies. It is contested by MacCarthaigh (2014) in research on a population of Irish state agencies.

Johnson, and Ford) who took over the term of their predecessor without prior elections are also coded as 'after term creating president' for agencies that were not their own creation, but that of the president they succeeded.

In addition, we have to control for a number of critical attributes of the organizations and their environment. Two such organizational characteristics that are identified as critical in organizational ecology are age and size: young and small organizations are associated with a lower likelihood of survival (Carroll and Hannan, 2000). Organizational *Age* is easily constructed from the establishment data. Regarding agency size, we used the Budget of the United States Government (1935-2011) to retrieve the budgets of all agencies for each year during their existence. After calculating the budget medium of our population, we ranked the agencies from smallest to largest budget. The agencies in the first quartile were categorized as a *Small budget agency* (coded 1), and agencies in the second, third and fourth quartiles are considered to be large budget agencies (coded 0).

Finally, we control for a few macro conditions – or, in organizational ecology terms, the population's overall carrying capacity. Carrying capacity is defined as the maximum number of organizations, as constrained by the availability of required resources, that can be sustained in a specific population's environment. First, to determine the annual *Federal revenues*, the total sum collected by the federal government through taxes on a yearly basis, we used figures provided by the Office of Management and Budget ([www.whitehouse.gov/omb/budget/Historicals/](http://www.whitehouse.gov/omb/budget/Historicals/) (last retrieved 7 May 2013)). This variable provides a proxy for the funds available to finance federal agencies. Second, in times of war, federal budget routines tend to be disturbed. Hence, the years of the following wars were coded as *War years* (1, and 0 otherwise):

World War II (1941-1945), Korean War (1950-1953), Vietnam War (1965-1975), Gulf War (1990-1991), Afghanistan War (2001-2011) and the Iraq War (2003-2011).

### ***Descriptives***

Before moving to the econometric analysis, a brief look into a few descriptive statistics provides a number of interesting observations. Figure 1 (above) plots the evolution of the number of independent US federal agencies over our time window, whereas figure 2 shows the number of agency exits per year.

[Insert figure 2 about here]

Although, in general, a growing population of agencies can be observed, a substantial number of organizations ( $n = 22$ ; 15%) did not 'live' longer than five years. Most terminated agencies ( $n = 41$ ; 55% of all terminated agencies) were abolished within 12 years after their creation. These results roughly correspond with death rates (49% within 12 years) and survival rates (40% in total) found in Lewis's (2003) study of 426 US federal organizations (including both independent agencies and cabinet bureaus) created since 1946 and studied until 1996. Similar death rates have also been reported in studies on a wide variety of private business populations (see, e.g., Brüderl and Schüssler 1990; Fichman and Levinthal 1991; Henderson 1999).

Boin et al.'s (2010) study of the life and times of New Deal organizations (both agencies and bureaus, created during president Roosevelt's first term between 1933 and 1936) found that more than half (54%) perished within 12 years. A slightly smaller number of agencies matured into 'old age' (> 70 years): in total, this represents 18 per cent of the agencies in the current study, as opposed to 25% of the New Deal agencies. However, many more public organizations in the current study could still make it well

into their 70s or beyond, as 22 of the total are currently middle-aged, with their survival being unknown (right-censored).

Termination in most cases was final. Only eight agencies were merged, replaced or otherwise changed formally and structurally.<sup>12</sup> Three were replaced by a different agency with similar functions ( $n = 3$ ; 4%), four absorbed into a larger agency ( $n = 4$ ; 5%) and just one merged with an agency of equal size and responsibilities ( $n = 1$ ; 1%).

Research findings of Lewis (2003) suggest looking into the impact of ‘unfriendly’ presidents to explain termination hazards. Almost half (46%) of the terminated agencies in our population were both created and terminated by presidents Truman and Roosevelt in the 1930s and 1940s. Republican presidents—reputedly more eager to cut back on ‘big government’—can only claim one quarter of the total number of casualties (27%). All other agencies were abolished under Democratic presidents. In fact, the majority of agencies ( $n = 44$ ; 60%) in our population were abolished by a president of the same political party as their creator. Though in many of those instances ( $n = 18$ ), an ‘unfriendly’ Congress may explain agency termination, this still leaves us with 33 agencies (45%) that were axed by ‘friends’ in both the executive and legislative branches of government.

## **5. Event-History Analysis**

Here we present the findings of our analysis. Table 1 provides means, standard deviations and correlations. Table 2 presents the results of the event-history analysis of the termination rates of US federal independent agencies. Model 1 shows the effects of

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<sup>12</sup> This contrasts with findings by MacCarthaigh (2014) in his study of Irish state agencies, and Yesilkagit (2014) on Dutch independent agencies. They found that mergers, replacements and absorptions were commonplace.

the control variables, including organizational characteristics such as age, size, board structure, and whether or not the agency began with a sunset clause and in (un)favorable environmental conditions (such as war years). In models 2 and 3, the independent variables of interest are entered in two blocks separately: the adaptation variables relating to additions and removals in mission statements (model 2), and the selection variables regarding the (squared) number of agencies (model 3). Model 4 offers the full specification with all control and independent variables. Finally, with models 5 and 6, we add two post hoc analyses (see below): with model 5, we explore potential agency age effects; with model 6, we examine the possible impact of non-founding presidential periods.

[Insert tables 1 and 2 about here]

When we look at the control variables, the findings are highly consistent across all six model specifications. We find that small agencies (those in the smallest quartile in terms of budget) are most vulnerable to termination. Not surprisingly, those agencies that were started with a sunset clause also ran a higher risk of being terminated.<sup>13</sup> The other control variables are non-significant in all six model specifications.

The results in table 2 offer little support for hypothesis 1alt, which predicted that the likelihood of termination decreases with adaptations in mission statements. Although both additions to and removals from the mission statement appear to be consistently negatively related to the likelihood of termination, the effect is statistically significant in none of the four model specifications (i.e., Models 2, 4, 5 and 6). The results shown in Table 2 provide strong support for hypothesis 2alt, which predicted that the likelihood of a given US federal independent agency being terminated would exhibit a U-

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<sup>13</sup> By contrast, Boin et al (2010, 400) found no apparent statistical association between sunset clause and survival in their study of 63 New Deal agencies.

shaped relationship with the overall number – or density – of independent federal agencies. This is clear from models 3, 4 and 5. The relationship between density and the failure hazard turns from negative to positive at 64 agencies, a threshold that falls well within the observed range, as can be seen in figure 3. Thus, beyond 64 agencies, increases in the number of agencies start to decrease the survival chances of incumbent agencies, suggesting that environmental selection processes do indeed operate.

[Figure 3 about here]

Two post hoc analyses offer further insights. First, in model 5, we observe that selection forces are especially prevalent in the three to nine-year age interval. Neither in the childhood days of a federal agency (younger than three years) nor in the era of adulthood (older than eight years) are the density (squared) coefficients significant. Second, in model 6, we further specify this effect by finding evidence for a ‘after term creating president’-effect. We found that young organizations are especially vulnerable under a president who did not establish that particular federal agency.

## **6. Discussion**

This article explored the relative importance of organizational adaptation and environmental selection in a population of public organizations. We started out with the common assumption that adaptation (or lack thereof) is key to survival. Agencies are—over time—likely to “adopt norms and values conducive to their survival, and take actions that will increase their chances of survival” (MacCarthaigh 2014: 7; Scott 2001). We then introduced the ecologist argument that competition for scarce resources is the dominant selection force in any organizational population, private or public. They claim

that organizational adaptation will *harm* rather than enhance a public organization's survival chance. We examined both explanations for survival empirically in the population of US federal independent agencies.

We can conclude that this study's results are not in line with what could be expected from an adaptation or design perspective, or from that of evolutionary economics. Adaptation did not have any significant effect of survival, either positively or negatively.

Selection is clearly influential in our population. Intriguingly, our post hoc analyses suggest that selection operates in a short time window of about six years, particularly if the president who created the agency is no longer in office. In line with organizational ecology theory, this period of vulnerability may be referred to as a 'liability of adolescence' (Brüderl and Schüssler 1990; Fichman and Levinthal 1991; cf. Stinchcombe 1965).

One explanation may be that these agencies, in their birth years, are buffered against the forces of selection, perhaps enjoying the protection of the establishing president. After surviving this period of adolescence, these agencies may have proven their usefulness, moving out of sight of the "selection eyes" of administration and Congress. If they survive into their 9<sup>th</sup> year, they tend to progress into a safe maturity phase.

Our study is, of course, not without limitations. These limitations – we note two here – point to promising avenues of future research. First, our conception of adaptation in public organizations may not have fully captured the organizational process of adapting. By focusing on changes to a public organization's mission, we sought for



evidence of “deep” adaptation. It is possible, however, that organizations adapt constantly, and much more effectively, by a series of incremental changes. Moreover, the timing of adaptation (say, right before a new President takes office) may be more important than the number of “deep” adaptations. In future work, we plan to expand our database by coding for both the timing of adaptation in relation to changes in the environment, as well as different types of organizational adaptation strategies.

Second, our findings may well be specific for the sampled organizations – i.e., US federal independent agencies. Yesilkagit and Christensen’s (2011) study on populations of public agencies in three European countries concluded that national administrative contexts have a strong impact on agency design and the effects thereof. In future research, we will explore the generalizability of our findings by comparing with studies of similar populations in other countries (Laegreid et al 2010; MacCarthaigh 2014; Yesilkagit and Christensen 2011) and of other types of public organizations.

Finally, we think that we broadened the research on public organization’s survival by introducing insights from organizational ecology. These insights have been much applied in the business and sociology literatures, but not so much in the study of public organizations. One contribution of this article is that we introduce the organizational ecology perspective into public administration’s study of public organizations to explore whether or not ecological logic is applicable.

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**Table 1: Descriptive statistics**

	<b>Mean</b>	<b>S.D.</b>	<b>Min</b>	<b>Max</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>
1. War years	0.409	0.492	0	1											
2. Federal revenues	726.759	785.66	3.6	2568	0.2										
3. Board	0.546	0.498	0	1	0.01	0.01									
4. Sunset clause	0.088	0.283	0	1	0	-0.04	-0.04								
5. Weak legislative origin	1.344	0.707	1	4	-0.01	-0.05	-0.03	0.18							
6. (Re-) distributive agency	0.292	0.455	0	1	-0.01	-0.04	-0.1	0	0.12						
7. Small (budget) agency	0.26	0.438	0	1	0	-0.02	0.19	-0.13	-0.1	-0.21					
8. Addition to mission statement	0.115	0.602	0	9	0.02	-0.05	-0.02	0.03	-0.01	0.01	-0.04				
9. Removals from mission statement	0.094	0.552	0	11	0.02	-0.01	-0.01	0.03	-0.01	0.02	-0.03	0.35			
10. Number of agencies	63.249	7.901	47	75	-0.15	0.61	-0.01	-0.06	-0.07	-0.05	-0.04	-0.01	-0.01		
11. Number of agencies squared	4062.863	982.095	2209	5625	-0.17	0.6	-0.01	-0.06	-0.07	-0.05	-0.04	-0.01	-0.01	1	
12. After term creating president	0.877	0.361	0	1	-0.01	0.25	-0.01	-0.07	-0.09	-0.07	-0.04	-0.04	-0.01	0.31	0.31

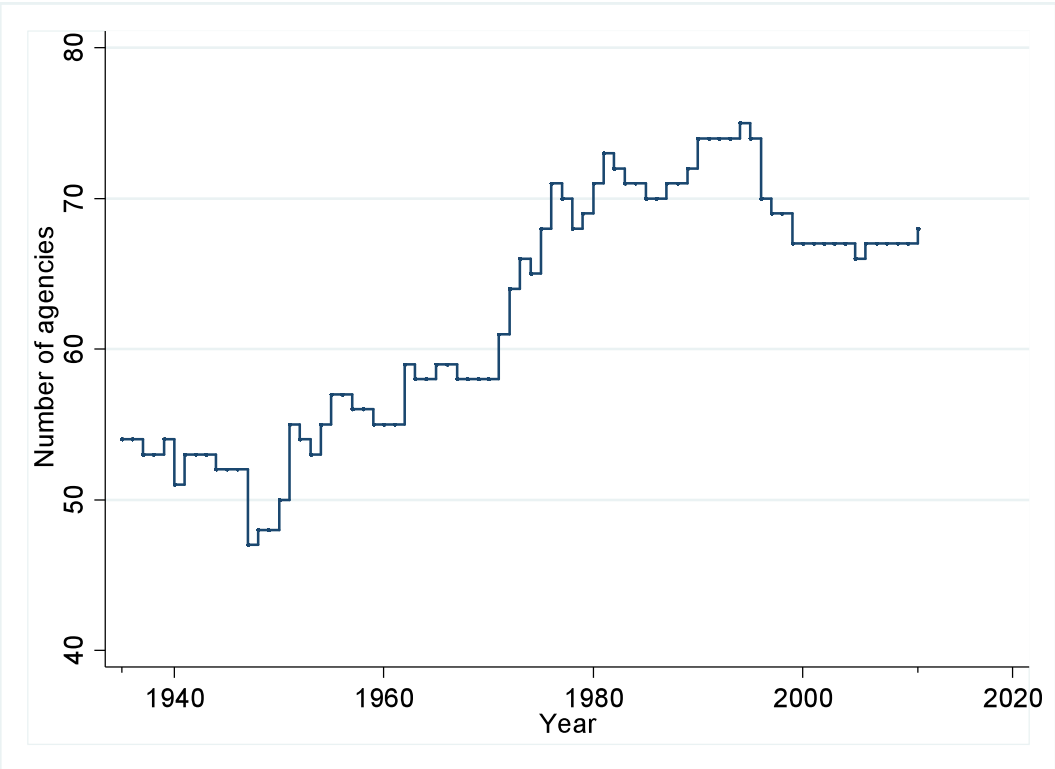


**Table 2: Piecewise exponential models of US federal agency exit**

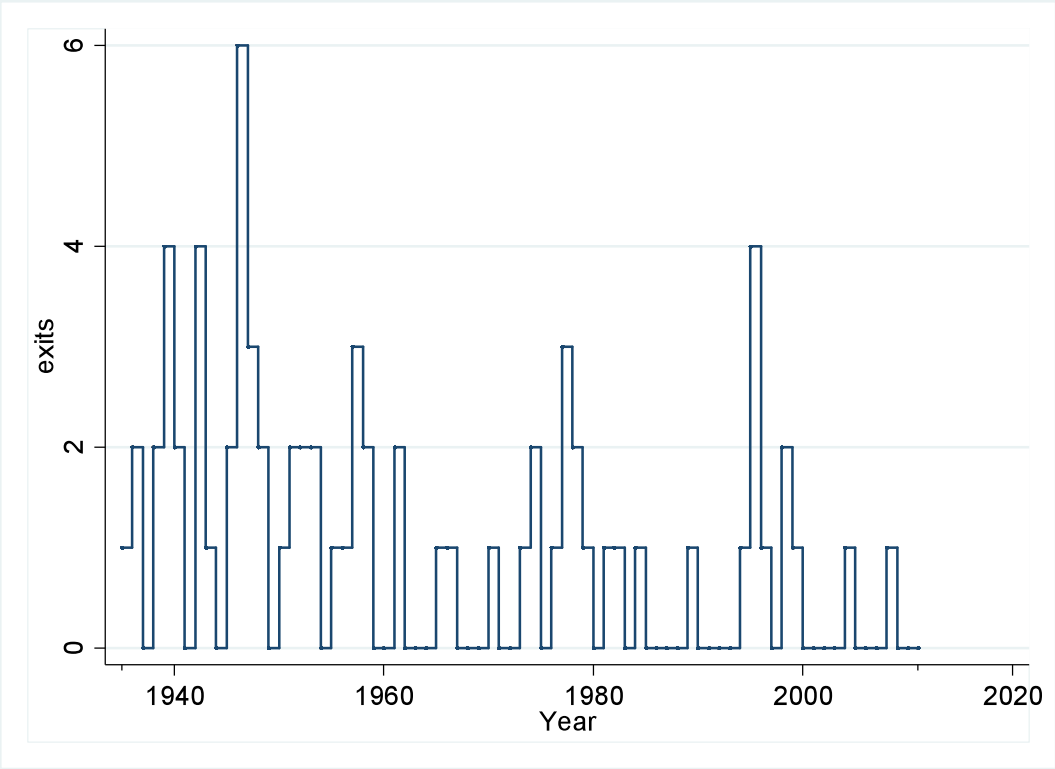
	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>	<b>Model 4</b>	<b>Model 5</b>	<b>Model 6</b>
Age < 3 years	-5.423 (10.78)**	-5.358 (10.65)**	14.229 (-1.54)	13.952 (-1.51)	-38.525 (-0.99)	-63.674 (-1.56)
3 =< Age < 9 years	-4.212 (11.31)**	-4.166 (11.22)**	15.491 (-1.68) †	15.197 (-1.65) †	39.798 (2.58)**	-62.393 (-1.53)
Age => 9 years	-5.602 (15.23)**	-5.566 (15.11)**	14.106 (-1.53)	13.803 (-1.50)	7.387 (-0.60)	-63.79 (-1.57)
<b>Control variables</b>						
War years	-0.269 (-1.05)	-0.235 (-0.91)	-0.196 (-0.71)	-0.157 (-0.57)	-0.172 (-0.62)	-0.127 (-0.46)
Federal revenues	0.00 (-1.48)	0.00 (-1.54)	0.00 (-0.56)	0.00 (-0.66)	0.00 (-0.82)	0.00 (-0.44)
Board	-0.341 (-1.39)	-0.329 (-1.34)	-0.344 (-1.41)	-0.332 (-1.36)	-0.318 (-1.30)	-0.343 (-1.40)
Sunset clause	0.956 (3.00)**	0.984 (3.08)**	0.906 (2.83)**	0.939 (2.93)**	0.959 (2.95)**	1.004 (3.11)**
Weak legislative origin	0.456 (3.62)**	0.454 (3.62)**	0.433 (3.46)**	0.431 (3.46)**	0.41 (3.24)**	0.422 (3.36)**
(Re-)distributive agency	0.383 (-1.46)	0.387 (-1.48)	0.36 (-1.37)	0.367 (-1.40)	0.426 (-1.62)	0.417 (-1.59)
Small (budget) agency	1.326 (5.09)**	1.301 (5.00)**	1.306 (5.03)**	1.283 (4.95)**	1.36 (5.19)**	1.321 (5.05)**
<b>Adaptation variables</b>						
Additions to mission statement		-1.14 (-1.30)		-1.095 (-1.26)	-1.065 (-1.23)	-1.116 (-1.27)
Removals in mission statement		-0.001 (0.00)		-0.02 (-0.07)	-0.053 (-0.19)	-0.037 (-0.12)
<b>Selection variables</b>						
Number of agencies			-0.634 (2.08)*	-0.625 (2.05)*		-0.896 (2.86)**
(Number of agencies) <sup>2</sup>			0.005 (2.01)*	0.005 (1.98)*		0.007 (2.77)**
Number of agencies					1.052 (-0.82)	
Age < 3 years					-1.418 (2.75)**	
3 =< Age < 9 years					-0.425 (-1.05)	
Age => 9 years						
(Number of agencies) <sup>2</sup>						
Age < 3 years					-0.008 (-0.79)	
3 =< Age < 9 years					0.011 (2.64)**	
Age => 9 years					0.003 (-1.04)	
After term creating president						85.907 (2.06)*
Number of agencies * after term creating president						-2.859 (2.02)*
(Number of agencies) <sup>2</sup> * after term creating president						0.023 (1.96)*
Log likelihood	-172.95	-170.78	-170.58	-168.55	164.75	-164.48
Degrees of freedom	10	12	12	14	18	17

†p<0.10 \*p<0.05 \*\*p<0.01; Standard errors in parentheses.

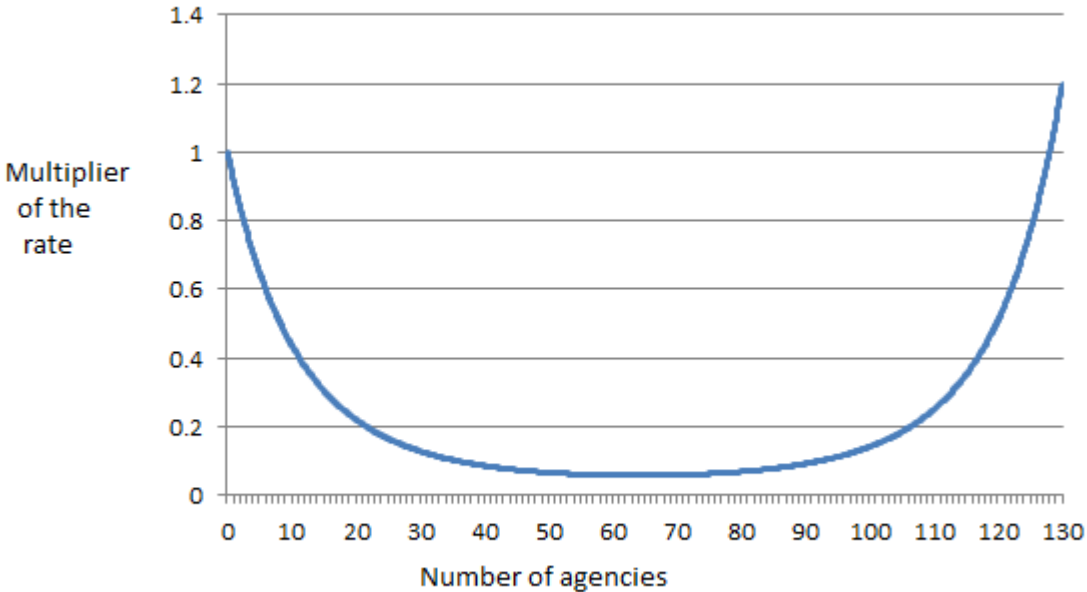
**Figure 1: Number of agencies by year**



**Figure 2: Number of agency exits by year**



**Figure 3: Relationship between the number of agencies and the hazard rate**



*Note: Based on Model 6.*