Accounting for Financial Innovation and Borrower Confidence in Financial Rule Making: Analogies from Health Policy

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ABSTRACT

In an industrial context where new products may appear regularly, the regulator—and the analyst who seeks to judge the benefit-cost ratio of the regulator's proposals—faces at least two variables relevant to decision making: the rate of new-product innovation and the distribution governing the market's beliefs in those future products. Following an analogy to health policy, where discussions of regulation's effects on innovation and consumer confidence are common, I propose that these variables be systematically taken into account in the kind of net-present-value analysis of proposed rules that currently characterizes benefit-cost analysis (BCA) of rules in environmental and health regulation and that characterizes the Office of Information and Regulatory Affairs (OIRA) review of these BCAs and the associated rules. This requires models of innovation and market beliefs under varying conditions of regulation, models that are often industry specific and draw on intuition and empirical research from a number of disciplines.

1. INTRODUCTION

What kinds of considerations should shape the ex ante review of regulation in the financial sector? In this area of regulation, as in others,

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governments engage in the regulation of regulation by establishing procedures for benefit-cost analysis (BCA) or regulatory impact analysis. The practice and theory of this form of policy review are common in the fields of environmental regulation, labor regulation, and other fields but, until recently, have not been highly elaborated for financial governance (Posner and Weyl 2013b).

In this essay, I consider two concepts that, in some of the academic literature at least, are considered to be policy-relevant variables in the health policy domain—the effects of regulation on new-product innovation and the effects of regulation on the beliefs of consumers. New regulations that impose costs on pharmaceutical manufacturers for carrying out certain kinds of tests during clinical trials or that impose new quality control restrictions for device manufacturing not only will affect projected expenditures by imposing direct costs on producers but will also potentially impede innovation by making it more costly to develop new products in the future. At the same time, these regulations might, if properly enforced and implemented, shape the beliefs of physicians or payers (and possibly even patients) regarding the efficacy or risk associated with the products in question. The ultimate determination is empirical, but it would be difficult to deny that in the usual understanding of policy analysis, either of these plausible effects would fall outside the concepts rendered as cost or benefit in the theory and practice of BCA.[1]

Innovation effects and confidence effects are concepts that are more generally incorporable as variables in BCA. Regulations can impose costs beyond those measured in the short-term by shaping the costs of bringing new products to market. If consumer welfare is affected over the longer run by new-product entry, then regulations that appreciably blunt product innovation should be viewed less favorably, ceteris paribus. If, moreover, consumer welfare is shaped by quality uncertainty, then as in the classic Akerlofian model, rational and risk-neutral consumers may forgo otherwise profitable transactions out of concern for the quality distribution or (not emphasized in the Akerlofian model, for risk-averse consumers) its tails.[2]

In theory, then, these costs and benefits of regulation exist. Yet what of their potential applicability to the financial sector? Are there rules

1. Note that even in the case of benefit-cost analysis (BCA) of rule making in the health sector, these variables are rarely taken into account.

2. Note, however, the results of Einav and Finkelstein (2011), who find that the market-shrinking effect derived in Akerlof's lemons model is not universal and may depend on the value of the product.

that can plausibly be thought to shape financial innovation? Are there regulations that might shape the product-quality beliefs of borrowers or investors in financial settings?

I identify a set of rules that, prima facie, may qualify for analysis with respect to their consequences for these two variables. They are rules that shape financial products understood as contracts between institutional lenders and consumers (borrowers) in those fields where there is continual appearance of new products (what I call, faute de mieux, contractual innovation, for now). In fields with continual innovation, analysts can expect that an appreciable increment of new products will appear on the market (understood not as an unregulated baseline but as its status quo at the time of rule making) for each time period (year or multiyear interval) relevant to policy making. The discounted net benefits of policies, including but not limited to new rules, will be shaped by the effects of the policies on the path of innovation and by the set of (induced) beliefs for each new product introduced or the set of beliefs over the collective set (distribution) of new products.[3]

I conclude that if incorporating an understanding of innovation effects and confidence effects is warranted, analysts will need models of the innovation process and models of consumer beliefs that are industry specific and backed by a range of social science research that spans behavioral and institutional approaches. This portends a more empirically expansive and, to some degree, imaginative approach for BCA than is currently envisioned even by its most steady defenders (Sunstein 2002) or ardent critics (Steinzor et al. 2009).

2. THE AMBIT OF ANALYSIS: FINANCIAL RULES SHAPING NEW CONTRACT PRODUCTS

I begin with three examples of possible rules, the first and third of which have been recently proposed formally in the U.S. Federal Register and the second of which—the Posner-Weyl proposal for a "Food and Drug Administration (FDA) for derivatives"—corresponds to an analogy from the health sphere to be applied to the financial sphere. The first and third of these examples are taken from the realm of consumer finance, in which the development of new financial products is understood to be a core feature of the sphere being governed and a central source of the

3. See Carpenter, Grimmer, and Lomazoff (2010) for a formalization of the effect of a particular form of evidence-based licensing regulation, known as approval regulation, on the downstream distribution of consumers' beliefs.

risk being regulated. The second is taken from the realm of systemic finance, where issues of innovation are also germane in the case of synthetic financial products.

2.1. Example 1: The Consumer Financial Protection Bureau's Regulation Z

Under its authority given by the Dodd-Frank Wall Street Reform and Consumer Protection Act (Pub. L. No. 111-203, 124 Stat. 1376 [2010]), the Consumer Financial Protection Bureau (CFPB) announced in 2012 proposed revisions to its Regulation Z. The CFPB's Regulation Z authority and charge derive from the Home Ownership and Equity Protection Act (HOEPA) (Pub. L. No. 103-325, 108 Stat. 2160), passed in 1994 as a form of update to the Truth in Lending Act (TILA) (Pub. L. No. 90-321, 82 Stat. 146 [1968]). Regulation Z thus implements the CFPB's HOEPA and TILA responsibilities. The Home Ownership and Equity Protection Act focuses on high-cost mortgages as higher-probability sites of additional risk and mortgage abuse. In its treatment of high-cost mortgages, the Dodd-Frank Act changes the interest-rate thresholds (triggers) at which different rules and restrictions apply and also changes the terms of regulation conditional on the application of the trigger. Under the Dodd-Frank Act, HOEPA thresholds are to be triggered when the annual percentage rate (APR) exceeds the average prime rate by 6.5 percentage points for most first-lien mortgages and by 8.5 percentage points for subordinate-lien mortgages. Loans that exceed these cost triggers are then subjected to special disclosure requirements and restrictions on loan terms. Specifically, the CFPB's proposed amendments to Regulation Z envision the following: balloon payments would be prohibited; creditors would be prohibited from charging prepayment penalties and/or financing points and fees; numerical and procedural restrictions on late fees would be imposed; creditors who originate open-end credit plans would have to assess consumers' ability to repay (creditors originating high-cost, closed-end mortgage loans are already required to do so); creditors and mortgage brokers would be prohibited from recommending or encouraging a consumer to default on a loan or debt to be refinanced by a high-cost mortgage; and before making a high-cost mortgage, creditors would be required to obtain confirmation from a federally certified or approved home-ownership counselor that the consumer has received counseling on the advisability of the loan.

These are some of many moving parts in Regulation Z and its pro-

posed amendments (77 Fed. Reg. 49,090 [August 15, 2012]). Yet taken separately for a moment, these various provisions might be considered to shape not only the direct costs and benefits of the rule (costs of compliance and benefits relating to averted fraud and consumer protection) but also the longer-term, indirect costs and benefits characterized by innovation impacts and confidence effects. High-cost mortgages are those in which the borrower pays a substantially higher rate in exchange for the capital benefits of the loan (a first-lien mortgage or primary domicile, in most cases) and in which the higher cost of the mortgage is in theory rationalized by the higher risk of the borrower (either the asset for which the loan is sought or some profile characteristic of the borrower that is associated with higher risk). These mortgages may serve particularly high risk populations or high risk assets and as such may serve purposes in a housing finance market characterized by heterogeneous consumers and assets.

Suppose that the above provisions are, in sum, net beneficial in the direct calculus of whether the costs of compliance are outweighed by the benefits of reduced fraud and abuse (and perhaps the corollary outcomes that purportedly accompany a lack of consumer protection, such as mortgage default or consumer bankruptcy, or perhaps even financial stress). If the adoption of these kinds of restrictions leads lenders to forgo the origination of new credit plans or to forgo the development of new mortgage products for these kinds of populations, then the long-run calculus of the social desirability of such a rule might change. On the other side of the ledger, it is possible that certain consumers who are eligible for high-cost mortgages might be more willing to look into them and ultimately sign up for one, perhaps appropriately, if they knew ex ante that certain forms of shocks would be less likely to materialize and/or that a demonstrably independent third party had already counseled them in advance about the risks and benefits of the financial product.

2.2. Example 2: Integrated and Simplified Mortgage Disclosures

Under two different statutes—TILA and the Real Estate Settlement Procedures Act of 1974 (RESPA) (Pub. L. No. 93-533, 88 Stat. 1724)—federal agencies have for 3 decades required disclosures on mortgages. The Dodd-Frank Act requires the CFPB to combine the two sets of forms used under TILA and RESPA into one unified disclosure portfolio comprising several documents. In the most recent rule making (for which final rules were due in October 2013) the CFPB proposed two integrated

disclosure forms—a new loan estimate form and a new closing disclosure form—which would replace earlier forms engineered by the Department of Housing and Urban Development and/or by the Federal Reserve. Beyond the merger of firms, a range of other features are proposed in the CFBP's amended rule (12 C.F.R. pts. 1024 and 1026; see 77 Fed. Reg. 51,116 [August 23, 2012]). These features include limitations on fees, such that no fees can be charged until consumers have the loan estimate form; the lender can provide written estimates before furnishing the loan estimate form but must accompany these with a disclaimer making clear that the lender can rely on the settlement agent or another broker to furnish the loan estimate form or the closing disclosure form, but in either case the lender retains all liability for the form's accuracy; the APR is now calculated in a much more inclusive and exhaustive fashion, including all up-front costs associated with contracting the loan; and there are numerical and procedural limits on closing-cost increases.

The integrated mortgage disclosure initiative is part of a much larger set of efforts aimed at enhancing disclosure, and for purposes of clarity and focus I sidestep this fascinating discussion. Yet a cursory review of the actions undertaken in this proposed rule suggests that long-term issues of financial innovation and induced consumer beliefs may be at play. To begin with, it is not only the forms that are changing but the set of restrictions on mortgage lenders that accompany the furnishing of a form. There is a prohibition on initiation fees until forms are provided and a limitation on closing fees. The APR is now calculated more exhaustively in ways that, some lenders fear, may overstate actual borrower costs. And while it largely continues past legal practices, the proposed rule prohibits secondary legal contracts between the lender and settlement agents or other third parties that would indemnify the lender from misrepresentation of the subjects of either form. Hence, costs of legal liability and associated transaction costs between lenders and agents may induce a network of lending parties to avoid potentially profitable relationships in delivering information to borrowers.[4] At the

4. In noting this simple point, I am not saying that the proposed rule is net disadvantageous, just that a set of considerations about how lenders contract with agents to provide mortgage information to borrowers would be among the set of affected variables that might be considered, especially insofar as these arrangements affect the willingness of lenders to offer new contracts or products. Note that my proposed framework for analysis would not point to employment effects of these contractual arrangements—more and more disclosure work moving in-house for mortgage lenders, plausibly—as a focus of BCA. Other frameworks would be needed for including these variables.

same time, the cap and restrictions on fees and the more inclusive APR estimate might serve to reduce that portion of the consumer beliefs distribution composed of Akerlofian lemons. Consumers might more readily enter into appropriate matches with lenders if the information separating various quality types (more appropriate loans from less appropriate loans) were more readily available.[5]

2.3. What If Innovation Is to Be Discouraged?

A skeptic of financial innovation in certain fields—believing it overrated or inherently bound up with casino finance—might object to the very basis of this exercise. If a significant fraction of financial innovation merely generates instruments that substitute gambling (the speculative and presumably less valid rationale for finance) for valid risk smoothing (the insurance function of finance), then one might wonder why financial innovation should be at all privileged in BCA calculations. In the health field, the critic might object, we can be reasonably confident that innovation has a plausibly established social value and therefore merits inclusion in policy-making discussions. In the case of financial BCA, there is (or should be) no such presumption.[6] Yet even if financial innovation is not beneficial for society, indeed even if it were known to be detrimental to social welfare, the effect of financial regulations on this variable should still be estimated. Put differently, both the social value of financial innovation and the issue of how to incorporate discussion of that social value into regulation are resolutely and ultimately empirical questions. In the fields of both systemic and consumer finance, the academic community and the government lack literatures that speak directly to the social welfare implications of these products. As it has been plausibly judged to serve in other policy domains, the implementation of BCA in financial regulation may help to clarify questions and plausible mechanisms by which regulation shapes the industrial organization of a field. In summary, even if we had good reason to be skeptical

5. I emphasize again that the empirics here are unclear and would need further analysis. The analysis of disclosure policies in psychology and behavioral economics suggests a mixed performance (Loewenstein, Suh, and Cain 2012). That said, alternative results might be obtained with different policies, so results of past disclosure experiments may not be portable to the range of potential disclosure instruments available, especially as regulators engage in learning by doing. The Consumer Financial Protection Bureau does appear to have contracted into a fairly extensive set of pretests with its integrated disclosure forms (Kleimann Communication Group 2012).

6. I am here repeating a point that emerged at the conference.

of financial innovation's value, we would want all the more to know how new regulation might shape this process.

2.4. Example 3: Premarket Review and Approval of New Derivatives Products (the Posner-Weyl Machine)

In a fascinating paper, Posner and Weyl (2013a) propose a premarket approval structure for financial products, focusing mainly on systematic contracts. As in a similar paper (Omarova 2012), they propose both a legal basis and a rationale for this kind of regulation, along with a set of innovations that could be subject to regulation. Posner and Weyl advance a set of test conditions for evaluating financial innovation, focusing essentially on the distinction between contracts as risk smoothing (insurance) or contracts as risk inflating (gambling) (Posner and Weyl 2013a, sec. I.B.1). They then propose that a financial products agency could be established with ex ante review authority over contractual innovations, extending the common-law principle of the insurable interest rule to allow a new Financial Products Agency (FPA)—modeled on the FDA's regulation of pharmaceuticals—to conduct ex ante BCAs of contractual innovations, with the effect of banning those that amount to gambling by not clearing them for market entry.[7] Posner and Weyl (2013a, sec. I.C) then examine the legal basis for this move and, before discussing issues of regulatory and administrative structure, offer the following list of potential contractual innovations to which the regime could apply: life insurance, mutual funds, credit default swaps, current and interest-rate swaps, equity options, statistical derivatives, income-based derivatives, real estate derivatives, and commodities futures markets.

3. ANALOGIES FROM HEALTH CARE AND OTHER FIELDS

In evaluating medical product rules—new phase-trial requirements or new device-manufacturing restrictions in quality control, for example—we would want to think not only about the usual costs (direct costs imposed on manufacturers or sponsors, possibly reflected in wholesale prices) and benefits (a better safety and/or efficacy profile of new prod-

7. Whether this is something that would require a new statute is less clear. Extending the common-law insurable interest rule to permit an agency like the Federal Reserve or the Commodity Futures Trading Commission to regulate derivatives in the way of ex ante approval might require simply a rule change. Creating a novel and separate entity within the executive branch (or as an independent regulator) with the specific review powers envisioned strikes me as probably requiring more than an executive order.

ucts) but also about the effect of these rules on new product development in the future and the effect of the rules on the set of beliefs that consumers (here physicians, prescribers, and also formulary managers) carry about the products, beliefs that would induce a different consumption strategy in the longer run.

In the literature on medical product regulation, these variables figure prominently. It is well known that among the central criticisms of the American government's laws for premarket approval was the purported existence of a drug lag by which European citizens, especially those in Great Britain, received access to new drugs years before Americans did (Peltzman 1974; Carpenter 2010, chs. 5 and 7). The literature on this effect is not as solid as is often claimed (see, for example, the criticisms of Hilts [2003]). There are, for instance, no studies demonstrating that for those therapeutic areas or diseases characterized by quicker entry of drugs into the United Kingdom relative to the United States, British citizens' health or welfare subsequently improved relative to that of similarly situated American citizens. And for the poster-child drugs of the drug lag—beta blockers for essential hypertension—a range of second-generation randomized studies shows that their efficacy is no greater than that of earlier diuretics and that the evidence base for their efficacy is characterized by much higher uncertainty within and across trials (Wilhelmsen et al. 1987; Messerli, Grossman, and Goldbourt 1998). Yet the FDA itself has, in the area of pharmaceutical regulation, shown awareness that its rules can shape the context of innovation, and it seems eminently reasonable to examine these regulations in that light.

The idea that, by screening the marketplace and deterring or rejecting the entry of low-quality products, a medical products regulator like the FDA can improve market beliefs in the distribution of available treatments is, at some level, the purest extension of an Akerlofian model (Law 2003; Carpenter 2010; Carpenter and Ting 2007; Carpenter, Grimmer, and Lomazoff 2010). The changed distribution of beliefs about medical products resulting from FDA regulation is often claimed to be a central effect, though not yet a measured benefit, of pharmaceutical regulation. In a series of creative papers using historical data, Law (2003), Law and Kim (2006), and Law and Marks (2009) show that state pure-food regulation and occupational licensing statutes in the early 20th century had effects on market confidence such that consumption of more regulated product distributions was higher, controlling for other observables, than consumption of less regulated distributions. Carpenter et al. (2012b) show a similar result for those therapeutic categories that

experienced the highest rate of brute product withdrawals under the Drug Efficacy Study Implementation program of the 1970s, while mandatory calorie posting in New York City is observed to have increased volume at the principal chain examined (Starbucks) in Bollinger, Leslie, and Sorensen (2011) (see also Jin and Leslie 2003).

3.1. Innovation and Quality as a Weighted Point Process

In the light of the considerations just outlined, we might approach the CFPB's Regulation Z or the Posner-Weyl machine in the following sense. A proposal to subject new derivatives to preapproval would be examined for the benefits that it carries (potentially calculable by thinking of the cost of a statistical crisis averted [Posner and Weyl 2013b]) and for its costs, by examining the delayed arrival of the financial product on the market and the direct costs of compliance by financial institutions. A proposal to impose on creditors the constraint that before making a high-cost mortgage, they would be required to obtain confirmation from a federally certified or approved home-ownership counselor that the consumer has received counseling on the advisability of the loan would be examined for its costs (understood as the compliance costs placed on the lender and perhaps any transaction costs prevailing between lender and third-party counselors) and for its benefits (probably understood as the reduction in fraudulent or bad mortgages contracted into by borrowers). We could further enumerate the kinds of costs and benefits considered, but in both of these scenarios, we would be missing something, namely the potential costs and benefits that unfold in the longer run as new products come to market.

I let the innovation of new products (π_i, which will be used to describe their benefits) be governed by three functions, first, an innovation distribution $\Lambda(t, \lambda_R)$, which is a single-parameter point process (the Poisson can be used for descriptive purposes, consistent with Reinganum [1982] and other literature) governed by rate λ, which is regulation dependent; second, a benefits distribution $F(\pi_i)$; and finally a quality-beliefs distribution $G(\pi_i)$, which describes the probability that a given consumer will believe that the product is net beneficial for him or her and hence will purchase it. The problem can be simplified by assuming that the set of consumers has a mass of 1, which allows me to drop one integral from the following characterization of the aggregate utility μ (think of this as time-discounted consumer surplus) delivered by the stream of future products:

$$\mu = \sum_{N=1}^{\infty} \int_{\theta_i}^{\infty} e^{-\delta t} \pi_{i,t} df(\pi)_{i,t} G(\pi_i). \quad (1)$$

In this equation, θ_i represents the market entry time of the product under the specified regime of regulation. (I will specify two different regimes of regulation.) The later the product enters the market, the less the expected utility the consumer will derive from it, all other considerations held equal. By understanding the innovation costs of regulations, the analyst would seek to understand the cost of reduced product innovation that might follow from regulations. Using the general optimal stopping framework set forth by Carpenter (2004), the analyst would then wish to compare the net-benefit profiles of a set of products under two regimes, with the first without the rule (regime W) and the second (regime R) with the rule. For the first product this would be[8]

$$\mu_{\mathrm{R},1} - \mu_{\mathrm{W},1} = \int_{\theta_{\mathrm{R},1}}^{\infty} e^{-\delta t} \pi_{1,t} df(\pi)_{1,t} G_{\mathrm{R}}(\pi_1) - \int_{\theta_{\mathrm{W},1}}^{\infty} e^{-\delta t} \pi_{1,t} df(\pi)_{1,t} G_{\mathrm{W}}(\pi_1). \quad (2)$$

This difference for the first product would be affected by two regulation-induced shifts, first the contraction of the integral over which the consumer mass enjoys the benefits of the product (assuming that $\theta_{\mathrm{W},1} < \theta_{\mathrm{R},1}$), and second the increase in the confidence of agents (consumers or investors) who might use the product under regulation.[9] If the form of the point process is assumed to be compound Poisson, then the expectation for the difference in arrival times under the regulated and unregulated innovation distributions would be $E[\theta_{1,\mathrm{R}} - \theta_{1,\mathrm{W}}] = 1/\lambda_{\mathrm{R}} - 1/\lambda_{\mathrm{W}}$, and the difference in net present value for the first product under regulated and unregulated distributions would be

$$\bar{\mu}_{\mathrm{WR},1} - \bar{\mu}_{\mathrm{W},1} = [G_{\mathrm{R}}(\pi_1) - G_{\mathrm{W}}(\pi_1)] \exp\left(-\delta \frac{\lambda_{\mathrm{R}} \lambda_{\mathrm{W}}}{|\lambda_{\mathrm{W}} - \lambda_{\mathrm{R}}|}\right). \quad (3)$$

Once this is summed and fully discounted (a market that sees very little innovation at all, irrespective of its regulated or rule-governed status,

8. I have assumed here that the actual product-benefit distributions do not differ across regulated and unregulated states. To do so would be to add another variable to the integrand.

9. Note that the model can easily handle a segmented market, such that some consumers never adopt the product no matter how high its benefits appear; that is, it can be the case that $\lim_{\pi_i \to \infty} G(\pi_i) < 1$ for some i. I do not consider the competitive effects of downstream innovation here, nor does the literature on health innovation and BCA of rules.

will not be one in which regulatory implications for future products will matter much), I get the expected net-present difference over the future stream as

$$E(\mu_{\mathrm{R}} - \mu_{\mathrm{W}}) = \sum_{N=1}^{\infty} e^{-\delta\theta_i}(\bar{\mu}_{\mathrm{R},i} - \bar{\mu}_{\mathrm{W},i}). \tag{4}$$

The computation of enhanced or forgone downstream benefits as a result of new financial regulations would then need to focus on the two variables of induced innovation under regulation ($\lambda_{\mathrm{R}}^{-1}\xi$) and induced market beliefs under regulation ($G_{\mathrm{R}}(X_i)$).

3.2. Applying the Framework: Regulation Z and the Posner-Weyl Machine

As an example of how these kinds of considerations would enter into financial regulation, let me first begin with a fictional example from health policy. In the domain of medicines regulations, a regulator like the FDA might consider adding a premarket testing requirement for new cardiovascular medicines (such as ACE inhibitors, which block a kidney enzyme) in light of safety issues that have arisen with their use (for example, liver or kidney damage). Cardiologists, having become aware of these problems, may have avoided the products in question in favor of earlier-generation therapies. A testing requirement would plausibly increase the testing costs and the stream of future products in the cardiovascular domain, with $\lambda_{\mathrm{R}}^{-1}$ separating further from $\lambda_{\mathrm{W}}^{-1}$, not only for the next cardiovascular product but for all future cardiovascular products. These would arrive later, and the consumer surplus derived by patients would accordingly be reduced, all other things held equal. At the same time, once new cardiovascular products were proven to have a better safety profile (or perhaps a better efficacy profile), cardiologists would plausibly respond by prescribing them more, hence increasing the value $G_{\mathrm{R}}(\pi_1) - G_{\mathrm{W}}(\pi_1)$ for the next product and then again for all future products in this class. Hence, the regulation-induced expectations would have potentially two effects, one explicitly on the actual product value delivered by the stream of future products and the second on the altered consumption stream that occurs because the consumer's (here, the cardiologist's) beliefs in the products have been changed. In evaluating the long-term performance of a rule to add certain kinds of tests to the development of cardiovascular medicines, a BCA would need to look beyond a calculation of benefits in the form of reduced liver toxicity versus costs in the form of the direct expenditure of firms on these tests.

The analyst would also need to examine the downstream consequences of the rule. To do so, considerations of the sort structured by equations (1) and (4) would need to enter into analysis.

Next, let us consider the CFPB's proposed amendments to Regulation Z. Consider the following two requirements proposed by the CFPB: creditors originating open-end credit plans must assess consumers' ability to repay, and before making a high-cost mortgage, creditors would be required to obtain confirmation from a federally certified or approved home-ownership counselor that the consumer has received counseling on the advisability of the loan. In both cases, the proposed Regulation Z amendment requires a lender to undertake action before generating a loan or a new credit plan. Customary static BCA would examine the cost to firms of engaging in compliance with these requirements, perhaps counteracted by the benefits of additional financial safety or consumer protection afforded by these requirements. But at least two longer-term variables would need to be examined for a fuller welfare accounting of the rule. First, the ex ante costs generated by these requirements might well retard the arrival of new loan contracts or lending plans. The degree to which this is a problem would depend, as equations (3) and (4) show, on the baseline rate of innovation in the sector as well as on the marginal effect of the regulation on innovation. Second, the changes might have the long-run effect of inducing some risk- or uncertainty-averse borrowers to enter the market and take out loans that they otherwise would have avoided. As equation (2) shows, the value of these induced beliefs would depend, again, in part on the baseline and regulation-induced innovation rates. Hence, a crucial feature of this simple theory of considering downstream regulatory effects on innovation and consumer beliefs is that the two factors systematically interact.

Finally, let us imagine the kind of institutionally enforced insurable interest doctrine imagined by Posner and Weyl (2013a). By subjecting contractual innovations to preclearance by a Financial Products Agency modeled on the FDA, the Posner-Weyl machine would have potential effects similar to those under consideration for a new FDA rule (at least at first I would expect the Posner-Weyl machine to have much more drastic effects, as the industrial environment has already adapted, and heavily, to FDA approval regulation in the medicines domain; see Carpenter [2010, ch. 10], on the transformed industrial structure of global pharmaceuticals). If the institutional change necessary for the Posner-Weyl machine were feasible only by a new statute, it is not clear that, in the present American context at least, BCA would play the role of

potentially changing the policy content of the proposal. But if, as Posner and Weyl claim, one could accomplish their designs through rule making and executive order alone, then BCA could ultimately play not only an advisory role but also a veto-inducing role if in fact OIRA decided to block or drastically scale back the proposal.

Some of the effects to be taken into account would be clear. For better or worse, the Posner-Weyl machine would change, and probably dampen, the rate of financial innovation in the prudential sector (this might be a good thing). Posner and Weyl clearly consider this issue, though they confuse regulation-retarding effects with bureaucratic risk aversion (the former could happen without the latter), arguing, "[W]e believe that bureaucratic risk aversion poses less of a threat to financial innovation than it does to pharmaceutical innovation" (Posner and Weyl 2013a, p. 1351). This is, of course, the kind of empirical question that should be the subject of careful BCA. Again, the simple (and eminently extensible) framework described in Section 3.1 suggests that the welfare implications of these effects would be pegged (multiplicatively, as in equation [3], in the case of compound Poisson process assumption for financial innovation—the rate at which new contracts are generated in the systemic sector) on the preregulatory rate of innovation in the sector. So too, the framework asks us to consider what, in the long run, might be the effect of preapproval on investment in new, previously vetted financial instruments, particularly by uncertainty-averse investors such as sovereign-wealth funds or certain kinds of institutional investors.

3.3. Incorporating Net Downstream Effects into Benefit-Cost Analysis

The essential intuition that animates the incorporation of downstream effects into BCA is composed of three ideas. First, innovation can be welfare reducing as well as welfare enhancing, and in either case, the regulator will wish to know about the effects of a new policy on this process. Second, some kinds of evidence on the effects of regulation are immediately available to rule-making agencies, while others are not. The customary analysis of costs and benefits is carried out before a rule is adopted, but some kinds of evidence—and I believe that innovation effects fall into this category—cannot be well estimated until the rule is in place and pertinent (observational or experimental) evidence is available. Finally, rule making is partially reversible in the sense that a rule can be abandoned or the regulator can switch to a new, more or less stringent, rule. In this section I relax the assumptions of the earlier model to account for these three possibilities.

While elaboration of further models is necessary to develop a fuller set of implications, several initial remarks are possible. First, some kinds of evidence will be incorporable only after a rule has been issued. Policy makers may wish to allow a rule to take shape in an experimental fashion to learn about larger general equilibrium effects of the rule that were not anticipable (or were poorly anticipable) at the stage of notice and comment or BCA.

Second, incorporation of downstream variables provides an additional rationale for revisitation or look back. If rule adoption is irreversible, then the policy maker forfeits the chance to learn about some of the most important plausible effects of the rule (Listokin 2008, pp. 546–47). The idea is not simply to revisit the original BCA but to systematically examine variables that could not, by definition, have been examined at the original stage.

Third, a look-back option can, but need not, lead the initial rule to be adopted more quickly. The idea that the look-back option (in the extended model, the possibility of a second-period rule revision or abandonment) leads the rule to be adopted more quickly follows straightforwardly from the reduction in option value occasioned by the greater reversibility of the first rule. Yet the addition of an additional source of variance (M)—the idea that some effects of the rule are estimable only once the rule has taken shape—adds an extra source of uncertainty.[10]

Finally, policy makers should be careful about hard look-back deadlines, keeping in mind that there are potential adverse effects of deadline effects in optimal stopping exercises (Carpenter and Grimmer 2009; Carpenter et al. 2012a).

4. THE NEED FOR FUNCTIONAL MODELS OF INNOVATION AND BORROWERS' BELIEFS

If these kinds of effects are to be taken formally into account in BCA of financial rules, then certain forms of analysis and computation will be required of society. Although I would not rule out the idea, it seems unrealistic and potentially inefficient for those conducting initial BCAs (the financial agencies themselves) or reviews of those BCAs (by OIRA or a similarly positioned superregulator) to conduct further analysis and model building of these questions. The analysis of innovation effects of

10. It may be that alternative modeling strategies are more appropriately matched to capturing this trade-off, such as the Bayesian structure for approval regulation (see, for example, Carpenter 2004).

policies is one involving the academic analysis of regulation (usually quantitative) that draws on theories of industrial organization in economics or strategy and management in the fields of business or management. The analysis of consumer beliefs entails contributions from the fields of marketing, psychology, and behavioral economics, to say nothing of experts in other possible disciplines as well (decision theorists, applied statisticians, and perhaps ethnographers and anthropologists in the field of consumer financial products or experts in bankruptcy law).

What would be needed to inform the analysts' estimate of $\lambda_R^{-1}\xi$ and of $G_R(X_i)$ would be portable functional estimates produced by external scholarship and/or organizations. By functional estimates, I mean not an entire model but a set of input-output functions into which a set of measurable inputs could be entered and a distribution of outcomes derived or simulated—an estimated regression equation would qualify but so would reduced forms from something like a Pakes-McGuire algorithm (Pakes and McGuire 1992). It is possible that in examining outputs, analysts would wish to focus not only on raw expectations but on other moments of the distribution.

Yet to say that the BCA analyst should delegate part or all of the work of coming up with functions is not to say that just any set of input-output functions for innovation and induced consumer beliefs should be pulled from the shelf. The environment of financial innovation probably varies heavily across the worlds governed in retail financial regulation and prudential financial regulation, to begin with an easier point. Yet it also seems clear that innovation mortgages and home loans are subject to different forces than that governing innovation in the credit card market or the auto loan market (the role of brokers is more pronounced in the former, for instance) and that consumer beliefs in a lending world in which the goal is owning a home or a car are different from beliefs involved when less tangible (available) goods are involved (credit cards, perhaps).

What this means is that the estimates and models used for the incorporation of innovation and confidence effects in financial regulation BCA should be market specific, ideally even product class specific,[11] or should at the very least take account of the heterogeneity of markets governed by the rule-issuing agency. Suppose, for instance, that the Posner-Weyl machine is implemented in some fashion through rule mak-

11. By this I mean a set of contract types, reducing for a moment financial innovation to the generation of new contractual forms.

ing. It would seem that the contractual innovation process probably differs in materially interesting ways for each of the nine categories of financial products mentioned in section I.C of their article (Posner and Weyl 2013a). Applying a broad set of models for innovation and market beliefs across all nine of these categories would seem to court misunderstanding and systematic error, given for instance that there are entirely separate academic literatures on real estate derivatives, life insurance, and a range of other financial product categories listed by Posner and Weyl.

5. CONCLUSION

The consideration of possible costs and benefits of regulation in a domain such as health policy leads to the consideration of a fuller range of costs and benefits that ought to be considered in financial policy. That stated, there remain reasons to regard the analogy with caution. As stated earlier, to begin with, the social welfare case for innovation in the financial realm is less clear. (I take this as a point not that the net benefit of financial innovation is known to be less but that we know less about its value.) It might be added, from an empirical standpoint, that even if we do regard health technology innovation as plausibly or certainly value adding, it is nonetheless true that in nearly all empirical regimes, there are stringent preapproval requirements placed on the market entry of these commodities (such as FDA-like approval requirements for new medical devices and drugs). Yet two other critical limits to the analogy are that, first, there are critical roles played by intermediaries in the health domain (doctors, nurses, and entire organizations of service delivery that serve to mitigate risk and inform consumer choice) and that there are different behavioral dynamics in health settings (such as the placebo effect or the possibility that diseases are self-remitting, both of which may complicate consumers' inferences about the relative benefit of treatments and strategies).

In an industrial context where new products may appear regularly over time, the regulator—and the analyst who seeks to judge the benefit-cost ratio of the regulator's proposals—faces at least two variables relevant to decision making: the rate of new-product innovation and the distribution governing the market's beliefs in those future products. I propose that these variables be systematically taken into account in the kind of net-present-value analysis of proposed rules that currently characterizes BCA of rules in environmental and health regulation and that

characterizes OIRA review of these BCAs and the associated rules. To do so requires specific models of innovation and market beliefs, models that would draw on intuition and empirical research from a number of disciplines.

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