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MEDICAID DRUG REBATES IN MEDICARE PART D LOW-INCOME SUBSIDY: AN ECONOMIC ANALYSIS OF THE PROPOSED POLICY AND ITS IMPLICATIONS FOR MULTIEMPLOYER PLANS

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The Pharmaceutical Industry Labor-Management Association (PILMA) is a partnership of unions and companies that work together on key state and national issues affecting organized labor and the biopharmaceutical industry. PILMA is focused on maintaining much-needed employment and leadership in the U.S. and recognizes that a vibrant domestic biopharmaceutical industry providing innovative, affordable medicines is vital to the American people and the nation.

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1. Introduction

One of the largest expansions of an entitlement program in U.S. history was the establishment of a voluntary outpatient prescription drug benefit known as Medicare Part D, which was part of the Medicare Modernization Act of 2003. Seniors have had access to this federally subsidized prescription drug insurance program since 2006. As a result of Part D, the number of elderly without prescription drug insurance has been greatly reduced; elderly out-of-pocket (OOP) spending on prescription drugs has decreased—particularly for those who gained insurance coverage; and elderly use of prescription drugs has increased (Zhang et al., 2009; Kaestner and Khan, 2011). In addition, Medicare Part D has resulted in a decline in prescription drug prices, and has cost the government less than originally forecast (Duggan et al., 2008; Hoadley, 2012).

Medicare Part D is unique among federal and state health care programs in its reliance on market mechanisms to compete for enrollees, and to lower drug prices. Private Part D plan sponsors operating with federal subsidies and access rules compete for Medicare enrollees based on premiums, plan design, and service (Duggan et al., 2008). Hence, Medicare recipients are able to choose from a variety of plans offered in their region based upon their individual preferences. Moreover, insurers are able to leverage their negotiating power to secure drugs at lower prices from manufacturers.

The rise in federal health spending has prompted proposals for Medicare reform as well as proposals to alter some aspects of Medicare Part D. Several reforms have been suggested; in this paper, we focus on the merits and drawbacks of one option—to impose Medicaid drug pricing and rebating rules on drug utilization of enrollees who receive Medicare Part D's Low-

Income Subsidy (LIS), which includes individuals who are dually eligible for Medicaid and Medicare.

Dual eligibles are Medicare beneficiaries who also qualify for Medicaid based on income. Prior to 2006, this group received prescription drug coverage through their state Medicaid programs. Under Part D, dual eligibles were reassigned to a benchmark prescription drug plan (PDP), and also received a full LIS, which covers their entire premium and any OOP costs except for nominal prescription copayments. Switching dual eligible persons from Medicaid to Medicare brought them under the pricing mechanism used in Part D, which differs from Medicaid. As noted, prices in Part D are determined via negotiation between plan sponsors or their agents (e.g., wholesalers, pharmacy benefit managers, purchasing coalitions) and pharmaceutical manufacturers; whereas in Medicaid drug prices are set administratively and incorporate legislatively mandated discounts. Specifically, since 1991, drugs purchased under Medicaid have been subject to minimum rebates from manufacturers, as well as a "best-price" provision wherein manufacturers are obligated to provide their drugs at the lowest prices made available to any private purchaser. This combination of a minimum rebate and a best price provision ensures that state Medicaid programs pay some of the lowest prices for prescription drugs in the country. As part of the Affordable Care Act enacted in 2010, the minimum rebate amount was raised to 23.1 percent of the average manufacturer`s price (AMP) for brand drugs and 13 percent for generic drugs (Spatz, 2010).

LIS beneficiaries constituted 40 percent of Part D enrollment, but accounted for 56 percent of total prescription drug expenditures in 2008 (CBO, 2011a). Considering that two-thirds of the LIS population are dual eligibles (6.3 million beneficiaries in 2009), and that this group has a comparatively higher burden of illness (Frank and Newhouse, 2007), the

Congressional Budget Office (CBO) expects the proposed policy to save Medicare Part D $137 billion over the coming decade. Critics, however, have argued that the Medicaid pricing regime would have consequences beyond lower prices for LIS drug utilization. Of concern is, due to the increase in the proportion of the population that would be subject to the minimum and best price provisions, rebates and discounts in other market segments would be reduced in order to offset reductions in revenues. Also noted is the potential for reduced investment in research and development of new therapies.

The objective of this report is to provide an analysis of the proposed policy to implement Medicaid drug pricing and rebating rules in Medicare Part D LIS. Specifically, the report aims to:

- Describe how prescription drugs are priced in health insurance markets including Medicaid, Medicare Part D, and private plans.

- Review the existing theoretical and empirical literature on the historical and predicted effects of the Medicaid Drug Rebate Program (MDRP).

- Provide a new theoretical model of the impact of the proposed MDRP policy on prescription drug prices.

- Discuss the policy implications for multiemployer health plans.

2. Prescription Drug Pricing in Insurance Markets

2.1. Drug Pricing in Medicaid

Medicaid is a jointly financed and administered state and federal government program that provides medical and long-term care for the nation's lower-income (largely non-elderly) families. Each state has some latitude to decide on eligibility rules, benefit structure, service

delivery, and payment rates; as long as they adhere to certain federal guidelines or obtain a waiver from a specific federal rule or regulation (AMCP, 2009). An outpatient prescription drug benefit is currently part of every Medicaid program, even though prescription drug coverage is optional for the states. Medicaid beneficiaries obtain their prescription drugs from participating pharmacies that procure them from wholesalers or manufacturers. There is virtually no cost sharing for most beneficiaries. Pharmacies receive payments from Medicaid agencies based on state-specific formulae, which include both acquisition costs (e.g., 10-15% below average wholesale prices) and dispensing fees (e.g., $3-$5 per fill). Pharmaceutical manufacturers pay mandated rebates directly to state Medicaid agencies and these rebates are taken into account when reconciling payments received from the federal government. Therefore, revenues derived through the MDRP accrue to both state and federal governments (CBO, 2005b).

The MDRP has been in place since 1991. Although under no obligation, manufacturers must enter into a rebate agreement with the Centers for Medicare and Medicaid Services (CMS) in order for their drugs to be covered by Medicaid and some other federal programs. As a condition of participation, pharmaceutical manufacturers must report two prices to CMS every quarter that are used to calculate rebate amounts—the Average Manufacturer Price (AMP) and the "best price". The AMP is the average price paid to manufacturers for drugs distributed through retail community pharmacies. It includes discounts given to wholesalers and to retail pharmacies, but does not include rebates paid by manufacturers to third-party payers (CBO, 2007). The "best price" is the lowest price paid by any private-sector purchaser excluding Medicare Part D plans, and it includes discounts, rebates, and other pricing adjustments (CBO, 2007). The "minimum" rebate remitted to states is the larger of either a flat percentage—currently set at 23.1 percent of the AMP for brand drugs and 13 percent of AMP for generic

drugs—or for brand drugs, the difference between the AMP and the best price (CBO, 2005a).

To limit the ability to substantially increase prices for private purchasers to offset rebate

payments, brand manufacturers are liable for an additional rebate if a drug's current AMP

exceeds an allowed inflation-adjusted level for a given quarter (CBO, 2005a). Finally, in certain

instances, state Medicaid agencies may be able to negotiate additional rebates by leveraging

formulary placement or eliminating prior authorization requirements. Overall, the net price

manufacturers received on Medicaid prescription drug sales was about 51 percent of average

wholesale price (CBO, 2005c).

2.2. Drug Pricing in Medicare Part D

Medicare Part D plans set premium amounts for their insurance products that are based

upon their expected costs, which are in turn a function of utilization levels, consumer cost

sharing, and negotiated prices (Gencarelli, 2005). An important feature of Part D is negotiated

pricing. Drug manufacturers offer private rebates to payers based upon demand volume,

formulary placement, or other contractual terms. The most generous rebates are generally

extended on branded drugs with therapeutic equivalents or generic substitutes, as the rebate

provides an incentive for the purchaser (or its intermediary) to place the drug on a "preferred"

tier with lower patient cost-sharing (AMCP, 2009; CBO, 2007). Large buyers can exert market

power with access to a large pool of patients, the threat of lower formulary placement, and by

limiting the number of competitors in a therapeutic class (AMCP, 2009). The Part D market

consists of many plans in each region, and it is widely considered to be a competitive market in

which cost savings from negotiated prices are passed on to beneficiaries and the federal

government (Hoadley, 2012). Data from the Medicare Trustees also show that these privately negotiated rebates have been increasing each year (CMS, 2012).

Dual eligible beneficiaries, who were covered by Medicaid until 2006, had their prescription drug benefits migrated to a benchmark Part D plan—of which the premium, deductible, coinsurance, and coverage limits are specified by CMS. Importantly, drug prices paid by Medicare Part D plan sponsors are not considered under the best price system used to calculate Medicaid-style rebates.

2.3. Drug Pricing in Other Private Markets

Differential drug prices across payers are perhaps most evident in the private sector. Cash-paying retail pharmacy customers who lack any prescription drug coverage often pay the highest prices (Cook, 1999). Purchasers with the ability to shift market share for drugs are more likely to be able to negotiate volume-based discounts and rebates with manufacturers. As in Medicare Part D, brand-name drugs with generic equivalents or other therapeutic alternatives are provided to private purchasers at the greatest discounts (CBO, 2007). Rebate negotiations can occur on a drug-by-drug basis or may be based on a bundle of drugs produced by the same manufacturer (Hoadley, 2005). Mail-order pharmacies and pharmacy benefit managers (PBMs) have typically been able to exert the greatest downward pressure on prices (Cook, 1999). Managing drug benefits for plan sponsors including employers and commercial health plans, PBMs are able to secure rebates from manufacturers, as well as lower reimbursement rates for pharmacies, by leveraging access to their book of business. Consolidation in the private market has allowed purchases to negotiate prices on behalf of patients. The five largest PBMs account for nearly 70% of the market share, and can cover as many as 60 million lives (AIS, 2012).

Based on the type of contract in place, PBMs may pass on all or part of negotiated rebates to their clients (Hoadley, 2005).

3. Medicaid Drug Rebate Program Effects: Existing Literature

A variety of papers have examined the MDRP and its theoretical and empirical effects. Both peer-reviewed and non-peer reviewed work has largely centered on the policy's impact on research and development (R&D) of new medicines and on prescription drug prices. We thoroughly review this literature below.

3.1. MDRP Effects on R&D

Critics of government proposals to directly negotiate or otherwise regulate prescription drug prices—using policies such as the MDRP—note that an important consideration is the extent to which prices affect pharmaceutical innovation. Prices can have a direct influence on R&D spending because internal cash flow is a major source of its funding (Grabowski and Vernon, 2000; Vernon, 2004; Giacotto et al., 2005). Profits may also be an important stimulus for R&D because future profit expectations can affect willingness to invest in R&D activities (Scherer, 2001). Therefore, administratively lowering prices using the influence of government's monopsonistic purchasing power—while increasing consumer surplus in the current period—may reduce pharmaceutical investment and innovation, and consequently adversely affect future consumer surplus (Hughes, Moore and Snyder, 2002). In this case, price controls redistribute gains from future consumers to current consumers (Santerre et al., 2006). Similar considerations underlie the evaluation of other recent policy proposals to control the growth of prescription drug spending such as establishing price ceilings or allowing Canadian

imports. Lakdawalla and Yin (2009) suggest an alternative avenue for prices to affect R&D and future innovation. In their model, mandatory rebates have the greatest effect on drugs with therapeutic equivalents compared to more novel drugs. Accordingly, under their model pharmaceutical firms would respond to mandatory rebates by altering investment patterns.

Most of the research in this area is empirical. Frank (2012) attempted to characterize the impact of Medicaid rebates on R&D for antipsychotic drugs. Prior to 2006, over 70 percent of sales for drugs in this class came through Medicaid. Hence, if net Medicaid prices were too low, then according to Frank (2012), one would expect low levels of drug development activity for antipsychotics due to a low innovation incentive. On the contrary, data reported by Frank (2012) showed that between 1994 and 2005, 107 drugs were in development and 30 new drugs in this class were approved for marketing, which the author suggests does not represent low R&D activity. Frank (2012) further argues that there was no evidence of an increase in innovative activity for antipsychotic drugs post-2006, when drug purchasing for dual eligibles was moved under Medicare Part D—despite the fact that all major manufacturers of antipsychotic drugs reported favorable price changes due to less rebates or higher net selling prices for this group (Frank and Newhouse, 2008). While the evidence presented in Frank (2012) is interesting, it is far from conclusive, as the study provides no valid counterfactual as to what would have happened in the absence of the Medicaid pricing structure. Moreover, the paper is limited to antipsychotic medications.

Troyer and Krasnikov (2011) used data on annual sales and new drug applications (approvals) to estimate the association between sales and innovation. The authors reported a positive association between sales (growth) and innovation, although not all estimates were statistically significant. The authors simulated the effect of Medicaid rebates on innovation by

assuming that rebates would dampen sales growth, and consequently innovation. Their model revealed that the opportunity cost of the Medicaid rebate program might have been as high as four fewer new drug approvals annually. There are several problems with the Troyer and Krasnikov (2011) study. Most importantly, the authors present no credible research design to address likely missing variables bias. In addition, the measures of innovation are limited and the lag time between sales and R&D was determined in an ad hoc fashion. Therefore, while the results are interesting and indicative that Medicaid pricing will decrease innovation, the study does not provide a definitive answer to the question at hand.

Other research has focused on the effect of price controls (or factors that affect drug prices) rather than the impact of Medicaid rebates specifically on innovation. Finkelstein (2004) examined how changes in demand (e.g., prices) affected investment in vaccine-related R&D. The author focused on three changes in government policy that affected demand for vaccines: 1) the CDC's 1991 recommendation that all infants be vaccinated against hepatitis B; 2) the 100% subsidy of the vaccine against influenza in Medicare in 1993; and 3) the introduction of the new Vaccine Injury Compensation Fund (VICF) in 1986. In each case, the policy increased demand for vaccines, and therefore willingness to pay and prices. R&D investments were measured by the filing of a successful patent application, the start of a new pre-clinical trial, the start of a new clinical trial, and FDA approval of a new vaccine. Finkelstein (2004) reported that each policy change was associated with increased R&D investment, and that every $1 increase in revenue was associated with a $0.05 increase in R&D investment. This is a high-quality study because it relied on plausibly exogenous changes in policy and presented substantial evidence that the research design was valid.

Giacotto et al. (2005) examined the association between pharmaceutical prices and R&D expenditures from 1952 to 2001, and estimated that a 10 percent increase in drug prices was associated with nearly a 6 percent increase in the growth of R&D investment. The authors determined that government price controls that pegged pharmaceutical price growth to the rate of general inflation would decrease R&D expenditures by 30% between 1980 and 2001—resulting in 330 to 365 fewer new drugs. In a related study based on the results of Giacotto et al. (2005), Santerre et al. (2006) estimated that government "influence" over pharmaceutical prices have caused them to grow more slowly than they would have without government entry into the pharmaceutical market (as purchaser), and that this impeded growth in prices has reduced innovation by as many as 188 million fewer life-years between 1960 and 2001.

Vernon (2005) conducted a study of 14 large pharmaceutical firms between 1994 and 1997, and showed that R&D expenditures were positively associated with profit margins and cash flow. Using derived estimates, Vernon (2005) simulated the effect of government price controls on R&D investment by assuming profit margins would be reduced as a result. Like many papers in this research area (e.g., Giacotto et al., 2005, Santerre et al., 2006), there are several potential flaws that limit the conclusiveness of the findings. In this case, it is clear that there are unobserved factors associated with firms that drive both R&D spending and profits, and the inability to fully control for these omitted variables is a legitimate concern.

Although the review of the evidence in this section is largely inconclusive, the most credible study—Finkelstein (2004)—strongly suggests that policies that reduce firm profitability such as price controls will reduce R&D investment in pharmaceuticals, one of the most R&D-intensive industries in the country (CBO, 2006). Less reliable studies largely came to the same conclusion. It is also clear from other evidence that pharmaceutical innovation has had a huge

financial and health impact on the US population (Lichtenberg, 2007, 2010; Murphy and Topel, 2003; 2006). Thus, any change in policy that limits prices and pharmaceutical firms' profits is likely to have significant economic and health consequences.

3.2. MDRP Effects on Drug Pricing

3.2.1 Theoretical Models of MDRP Effects on Drug Pricing

Scott-Morton (1997) was one of the first to present a theoretical framework to examine manufacturer price responses to the MDRP. Under the mandated discount and best-price—or the most-favored customer (MFC) rule—firms have a disincentive to give the lowest prices to private customers because doing so would also reduce their profits on sales to Medicaid programs. Hence, the hypothesis is that price dispersion declines when a drug is subject to the MFC clause (Scott-Morton, 1997). Manufacturers would calculate profits under both alternatives and choose a price distribution that maximizes overall profit. Klibanoff and Kundu (2010) present a similar theoretical model and reach largely the same conclusion as Scott-Morton (1997)—that mandatory rebates increase the minimum market price and decrease the maximum market price (i.e., less price dispersion).

3.2.2 Empirical Evidence of MDRP Effects on Drug Pricing

Several governmental studies have examined the impacts of the 1991 implementation of the MDRP. Very early on, the GAO (1991) reported prices for drugs purchased on the Federal Supply Schedule increased by an average of 8.3 percent, raising costs by 21 and 14 percent for the Veteran's Administration (VA) and Department of Defense (DoD), respectively. Similarly, the average best price discounts for drugs purchased by health maintenance organizations

(HMO) and group purchasing organizations had fallen to basic rebate levels by 1993 (GAO, 1994). Further data reflecting this trend showed that, for a sample of 800 brand name drugs, best price discounts fell from an average of more than 36 percent in 1991 to 19 percent in 1994, with the number of drugs offered at discounts dropping from 33 to 9 percent (CBO, 1996). For Medicaid programs the MDRP was beneficial—the 15.4% of AMP rebate resulted in manufacturers paying a total of $1.8 billion in 1994, which reduced outpatient prescription drug expenditures from $9.5 billion to $7.7 billion. During the first four years of the MDRP, total rebates collected as a percentage of total expenditures increased consistently (CBO, 1996).

Fairly rigorous empirical analyses of the effect of the 1991 MDRP legislation on drug prices are provided by two papers. Scott-Morton's (1997) work estimated that the average price of a brand facing generic competition increased by about 4 percent as a result of the 1991 MDRP legislation. Moreover, due to the size and inelasticity of the Medicaid market, drugs with high Medicaid market share were granted fewer private rebates in excess of the base rebate, along with an increase in market price. The critical importance of the size of the market segment (relative to the entire market) under the MFC rule is modeled more formally by Duggan and Scott-Morton (2006). In this research, the authors examined prices of the top 200 drugs in 2002 and concluded that a 10 percentage point increase in Medicaid market share was associated with a 7 to 10 percent increase in average drug price (in the full market), and that the average price for private purchasers would have been 13.3 percent lower in the absence of the MFC clause (Duggan and Scott-Morton, 2006).

To summarize, the papers reviewed in this section provide compelling evidence that the Medicaid Drug Rebate Program has prompted reductions in the rebates extended to private payers, resulting in higher drug prices in these non-MDRP segments. These papers also

demonstrate that the size of the market segment under the MDRP is also a key determinant in drug price responses. These findings are highly relevant for assessing the likely impacts of the proposed policy to impose Medicaid-style rebates on prescription drug spending among LIS beneficiaries.

3.2.3 Estimated Effects of Applying MDRP in the Medicare Part D LIS Market Segment

Several papers have predicted the impact of adopting the MDRP for the LIS proportion of Medicare Part D. A Commonwealth Fund report (2007) analyzed the hypothetical use of government negotiated drug pricing (currently prohibited by law) on costs. Government negotiated prices consisted of three alternatives: switching dual eligibles back into Medicaid, setting prices for unique drugs, and establishing a public buying cooperative. The report estimated that paying Medicaid rates for dual eligible beneficiaries would reduce Part D spending by $57.5 billion between 2008 and 2017 (Commonwealth Fund, 2007). However, the report also showed that private payers would pay more, thereby reducing net savings by over $25 billion. A limitation of the report is that it does not provide information as to how it came to these conclusions, although it appears that the authors of the report relied on other CBO studies.

The CBO (2008) conducted a similar analysis in a report to Congress on budgetary options for health care. It estimated that requiring manufacturers to pay a minimum rebate— then 15.1 percent of AMP—on all drugs covered under Part D—not just for dual eligibles— without the best-price provision would save the federal government $110 billion over ten years. The CBO also estimated the impact of modifying the rebate amount in the Medicaid program. The three options examined were to: eliminate the best-price provision and increase the flat rebate to 23.1 percent of AMP; eliminate the best-price provision and increase the flat rebate to a

budget neutral percentage; and to increase the flat rebate to 23.1 percent of AMP with the best-price provision remaining intact. The first option would have resulted in an additional $1.2 billion of savings to Medicaid over the 2010 to 2019 period. However, it was concluded that in the absence of the best-price provision, Medicaid might face an increase in prices, especially for new drugs. Alternately, the third option would result in a net deficit reduction of $7.2 billion over ten years, and would enable manufacturers to give greater discounts to private purchasers. The key conclusion of this report is that there is a well-documented trade-off between the "best price" provision and the number and magnitude of discounts offered by pharmaceutical manufacturers in the private market. The CBO (2008) concluded that achieving lower prices in Medicaid by demanding larger rebates—or lower prices for dual eligibles using the MDRP— would come at the expense of higher prices for private payers because manufacturers would respond by offering fewer discounts. Ultimately, policymakers adopted the third option (i.e., a 23.1 % rebate with the best-price provision). This revised law has been in place for Medicaid since 2010.

The proposed "America's Affordable Health Choices Act of 2009" also recommended drug prices for dual eligible enrollees be subject to Medicaid-level minimum rebates. CMS estimated that such a move would result in $79 billion of rebate payments over a ten-year period (CMS HR3200, 2009). Similarly, in their most recent report outlining measures for reducing the deficit, the CBO calculated that mandating a minimum rebate (23.1% of AMP) on drugs for all LIS beneficiaries in Part D would generate savings of $137.4 billion between 2013-2022. (CBO, 2012a). The CBO estimate does not model the impact of a mandatory rebate on the private sector or on R&D.

Other reports have attempted to estimate the effect of implementing the MDRP in the LIS

sector of Medicare Part D. Holtz-Eakin and Ramlet (2011) argue that such a move would create

price distortions for the remaining 60 percent of Part D enrollees. In the "low impact" version of

their model, they anticipate manufacturers would uniformly reduce rebates by 50 percent for all

Part D plans leading to a 19.6 percent increase Part D premiums. Under a "high impact"

alternative, mandatory rebates would drive further segmentation of the Part D market. As a

consequence, plans with a disproportionately high majority of non-LIS beneficiaries would see

premiums increase by 39.4 percent. These estimates translate to increases of $1.5 and $3.5

billion in patient out-of-pocket costs. Frank (2012) has argued otherwise, noting that Part D

negotiated prices are not included in the rebate calculation. Although the work of Frank (2012)

and Hotz-Eakin and Ramlet (2011) appeals to basic economic intuition, and sometimes leans on

empirical results reported by Scott-Morton (1997) and Duggan and Scott-Morton (2006; 2008),

these policy papers do not present formal models.

4. A New Theoretical Model of Drug Pricing under MDRP

4.1 The Model

A likely reason for the scant literature on the impact of MDRP is the inherent complexity

of the prescription drug market—several manufacturers producing alternative treatments

compete in hundreds of geographically differentiated marketplaces, some of which are

segmented by age, income, and location of potential customers. As a further complication,

pharmaceutical companies are multiproduct firms that engage in bargaining agreements with

health insurance sponsors and retail pharmacy chains in deals that frequently involve bundling

discounts on the joint purchase of multiple drugs. Our approach is to offer a representation of

this market that preserves its key features and yields predictions that have substantial intuitive appeal. By simplifying the model, we make clear what the incentive transmission channels are that link the Medicaid rebate program to prices in other market segments. We answer the fundamental question of what factors could cause distortions in other market segments when a mandatory government rebate is set for the Part D LIS. We also analyze the consequences of changing the size of the market affected by mandated rebates, as does the proposal that we focus on in this report. We then generalize the model to incorporate additional institutional features. Gaining in realism makes the notation far more complicated and obscures the reasoning, but we show intuitively how the basic incentive results remain valid.

To begin, consider a drug manufacturer selling a single, patented product in three discrete market segments. Total sales are given by

(1) $$Q = x(p_x) + y(p_y) + z(p_z)$$

where $x(p_x)$ is the demand for this drug in the private (i.e., non-Medicare) insurance market at price p_x. Similarly, $y(p_y)$ denotes demand in the non-LIS Medicare Part D market, and $z(p_z)$ is demand in the LIS Medicare Part D market.[1]

In the absence of price regulation, this monopolistic manufacturer will set prices in these three separate segments to maximize profits given by

(2) $$\pi^m = [p_x - c]x(p_x) + [p_y - c]y(p_y) + [p_z - c]z(p_z) - F$$

It is possible to treat these three segments separately because consumers belong to one or the other depending on their income, or if they are enrolled in employer sponsored drug insurance. In other words, the seller should not be concerned about arbitrage as each beneficiary is only

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[1] Here and throughout the paper, we refer to the LIS and non-LIS Medicare Part D segments as distinct markets, which is not to say that Part D plans do not include both enrollee types.

present in one of the markets. Notice also that we have assumed a constant return technology for the drug industry that is characterized by a large fixed drug development cost F, and a constant marginal cost c, which in many cases is likely to be negligible. To further simplify the analysis, we assume that at the relevant drug prices all consumer types are always served (i.e., $x(c) > 0$; $y(c) > 0$; and $z(c) > 0$), that fixed cost F is low enough to rule out the possibility of a drug company leaving the industry (i.e., zero optimal production). The solution for this problem is a standard one. For product $x(p_x)$, the optimal price p_x is given by the solution to

$$(3) \qquad \frac{\partial \pi^m}{\partial p_x} = x(p_x) + [p_x - c]x'(p_x) = 0$$

Notice that demand elasticity is given by

$$(4) \qquad \frac{x'(p_x)p_x}{x(p_x)} = \varepsilon_x$$

Thus, optimal pricing for each product follows the well-known inverse elasticity rule for each segment and equation (3) can be rewritten as

$$(5) \qquad \frac{p_x - c}{p_x} = \frac{-1}{\varepsilon_x}$$

As equation (5) makes clear, the markup of price over marginal cost depends on the price elasticity of demand. As the elasticity becomes larger, price approaches marginal cost.

Consider now the following simple rebate policy: Medicare will receive a rebate equal to some percentage α of the private insurance market price per unit purchased by LIS Part D beneficiaries. That is

$$(6) \qquad r = \alpha p_x z(p_z), \qquad \alpha \in [0,1]$$

The rebate amount currently in force in Medicaid, and under the proposed policy, is such that $\alpha=0.231$ of the average manufacturer price (AMP) or the difference between the best price and the AMP, whichever is larger. We ignore the best price provision since in the current simple model there is only one price (p_x) offered in the private sector.[2] That single price (p_x) is the AMP. Negotiated prices for PDPs and MAPDs, for both non-LIS (p_y) and LIS (p_z) markets, are excluded from the best-price provision by the Medicare Modernization Act in order to help Medicare Part D insurance providers secure better drug prices (CBO, 2007, p.16).[3] In our model, the effective price charged to Medicare for LIS Part D beneficiaries is $p_z - \alpha p_x > 0$, such that the following profit function is maximized

(7) $$\pi^r = [p_x - c]x(p_x) + [p_y - c]y(p_y) + [p_z - c]z(p_z) - \alpha p_x z(p_z) - F$$

The optimal prices under best price regulation solve simultaneously the following three equations

(8a) $$\frac{\partial \pi^r}{\partial p_x} = x(p_x) + [p_x - c]x'(p_x) - \alpha z(p_z) = 0$$

(8b) $$\frac{\partial \pi^r}{\partial p_y} = y(p_y) + [p_y - c]y'(p_y) = 0$$

(8c) $$\frac{\partial \pi^r}{\partial p_z} = z(p_z) + [p_z - c]z'(p_z) - \alpha p_x z'(p_z) = 0$$

Analyzing these first-order conditions sheds some light on the incentive channels relating the establishment of rebates to drug prices in other market segments. First, notice that price p_y for

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[2] Dealing with AMP suffices to characterize the incentives of the best price rebate system. Klibanoff and Kundu (2010) show that the lowest price offered any customer should never be lower than AMP minus the rebate. Indeed, the CBO (2007) has documented that since the implementation of the Medicare Part D program in 2006, the best price offered has been a little more than 15% below AMP, when the rebate was defined as 15.1% below AMP.

[3] The current computation of AMP renders the model of Klibanoff and Kundu (2010) not directly applicable to the new environment with Medicare Part D since in the past AMP also included Medicare drug prices.

the non-LIS Part D market is solely determined by equation (8b)—that is, independent of the AMP given by p_x and the level of the rebate α. Frank (2012) criticizes Holtz-Eakin and Ramlet (2011), who claim otherwise, on this point. Frank (2012) argued that non-LIS Part D prices should not be affected after the introduction of the rebate because these markets are independent: if drug companies have set prices so as to maximize profits before the implementation of the rebate program, then the same prices should be optimal after the rebate is introduced.

There are, however, considerations that may cause this result to not hold. For example, if drug companies enjoy scale economies (or diseconomies), prices in the private insurance market, and the rebate in the LIS segment of Part D will determine total sales $x(p_x)$ and $z(p_z)$, which in turn affects the level of marginal costs, and thus influences the price p_y of the non-LIS. Consider the following possibility: assume that rebates end up increasing p_x for private insurance, which would reduce total sales in that market. If the drug company enjoys economies of scale, reduced production will increase marginal costs, which in turn will trigger an increase in price p_y for the non-LIS market. The idea that economies of scale may link the different segments is not strong because overall production changes are not likely to be large enough to alter near-zero marginal costs.

However, there are there other ways by which non-LIS prices and private market prices may be dependent on changes in the Medicaid rebate, as suggested by Holtz-Eakin and Ramlet (2011). One possible mechanism is that drug pricing before the rebate might be more competitive, and the market structure more complicated, than simply monopoly or monopolistic pricing as assumed in this basic model. Today, drug companies may prefer to lower prices sufficiently for PDPs to be competitive in their bidding processes. Indeed, the extant literature indicates prescription drug demand is relatively inelastic, with estimates varying by therapeutic

class, ranging from -0.10 to -0.60 (Goldman et al., 2007; Roebuck, 2012).[4] This suggests current pricing is not characteristic of monopolies. With inelastic demand, however, the optimal strategy is to increase prices for the non-LIS, which are now excluded from the computation of AMP, thus not affecting the size of the rebate.

As to the question of whether or not prices in the private insurance market segment will increase under the rebate policy, the system of first-order equations (8a)-(8c) shows that there are several arguments to consider. Changes in p_x, the elasticity of $x(p_x)$ as well as the price p_z, the elasticity of $z(p_z)$, or the size of the rebate discount α may all affect prices in the private market. Unless we put more structure on the model, it will not be possible to identify what drives the movement of prices after the establishment of the rebate.

To achieve that goal, let us ignore the non-LIS market segment, as its prices do not enter the computation of AMP, and the incentives leading to price changes are less obvious as previously discussed. With a single drug and two market segments, the price of this drug in the private insurance and LIS Part D segments are automatically linked as follows

$$(9) \qquad\qquad p_z = (1 - \alpha)p_x = (1 - \alpha)p$$

Then, rewrite the demand for prescription drugs in private insurance and LIS Part D as

$$(10a) \qquad\qquad x(p) = q(p)$$

$$(10b) \qquad\qquad z(p) = (1 - \beta)q(p) + \beta\bar{z}, \qquad \bar{z} > 0, \qquad \beta \in [0,1]$$

The latter relationship is critical to understanding the results of the model. The demand for drugs in the LIS market is defined as a convex combination of demand by private insurers $q(p)$ and a

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[4] For example, Goldman et al. (2004) estimated the following class-specific price elasticities: -0.45 for nonsteroidal anti-inflammatory agents (NSAIDs), -0.44 for antihistamines, -0.26 for antihypertensives, -0.26 for antidepressants, -0.25 for antidiabetics, -0.34 for antihyperlipidemics, -0.33 for antiulcerants, and -0.32 for antiasthmatics. A working paper by Roebuck (2012) reports elasticities for 29 therapeutic classes that are somewhat lower in absolute magnitudes.

fixed, price insensitive drug amount $\bar{z}$. This formulation assumes that, in general, LIS demand is less elastic than private demand. Demand for drugs by LIS could, for instance, be more inelastic because of the regulations around Part D formularies But at the same time, a greater readiness to include generics might turn the demand for drugs in this market segment more elastic. Parameter β indicates how insensitive LIS demand for drugs is relative to private insurance. Drug demand elasticity in the private insurance market is given by

(11a)
$$\varepsilon_x = \frac{pq'(p)}{q(p)}$$

while that of LIS is

(11b)
$$\varepsilon_z = \frac{p(1-\beta)q'(p)}{(1-\beta)q(p)+\beta\bar{z}} = \frac{pq'(p)}{(1-\beta)q(p)+\frac{\beta}{(1-\beta)}\bar{z}}$$

Thus, demand in the private market is more elastic than LIS ($\varepsilon_x < \varepsilon_z$) as long as $\beta < 1$. When $\beta = 0$ both demands are equally elastic ($\varepsilon_x = \varepsilon_z$); while if $\beta = 1$, then $\varepsilon_x < \varepsilon_z = 0$ (i.e., the case when LIS demand is perfectly inelastic at the relevant prices).

Next, let $\gamma \epsilon [0,1]$ denote the market share of LIS over LIS plus private. This share is determined exogenously by government policy. Total demand for drug manufacturer becomes

(12)
$$Q(p) = (1-\gamma)q(p) + \gamma[(1-\beta)q(p) + \beta\bar{z}] = (1-\beta\gamma)q(p) + \beta\gamma\bar{z}$$

The optimal price p^m for the drug manufacturer, in the absence of any regulation, to maximize profits given by

(13)
$$\pi^m = (p-c)[(1-\beta\gamma)q(p) + \beta\gamma\bar{z}]$$

is derived by solving

(14) $$\frac{\partial \pi^m}{\partial p} = (p-c)(1-\beta\gamma)q'(p) + (1-\beta\gamma)q(p) + \beta\gamma\bar{z} = 0$$

Using the generalized inverse elasticity rule associated with equation (14) yields

(15) $$\frac{p^m - c}{p^m} = \frac{-1}{\varepsilon_x} - \frac{\beta\gamma\bar{z}}{(1-\beta\gamma)p^m}$$

Similarly, under the rebate regulation, p^r maximizes

(16) $$\pi^r = (p-c)[(1-\beta\gamma)q(p) + \beta\gamma\bar{z}] - r\gamma[(1-\beta)q(p) + \beta\bar{z}]$$

given that the per unit rebate amount is

(17) $$r = \alpha p$$

Thus, p^r is the solution to

(18) $$\frac{\partial \pi^r}{\partial p} = (p-c)(1-\beta\gamma)q'(p) + (1-\beta\gamma)q(p) + \beta\gamma\bar{z}$$

$$-\alpha\gamma[(1-\beta)q(p) + \beta\bar{z}] - \alpha p\gamma(1-\beta)q'^{(p)} = 0$$

As can be seen, equation (18) is a very cumbersome expression for which the solution is not straightforward. Thus, it is difficult to compare p^m to p^r. However, we can evaluate condition (18) at p^m even without solving (14) explicitly. Note that the first part of the expression in equation (18) is equation (14), which at the optimal choice is equal to zero. Substituting equation (14) into (18) yields

(19) $$\frac{\partial \pi^r}{\partial p}\Big|_{p=p^m} = -\alpha\gamma[(1-\beta)\{q(p^m) + p^m q'(p^m)\} + \beta\bar{z}]$$

22

This expression is the effect of a price increase on profits when rebates are in place, and is evaluated at the optimal price p^m without the rebate. Whether or not prices go up or down relative to p^m under the proposed regulation depends upon the sign of this expression.

Consider next the case when $\beta = 0$ (or the limit as it approaches 0), which is the case when the elasticity of demand is equal in both the LIS and private market segments. Substituting (14) when $\beta = 0$ in equation (19) we have

$$(20) \qquad \frac{\partial \pi^r}{\partial p}\Big|_{p=p^m} = -\alpha\gamma[q(p^m) + p^m q'(p^m)] = -\alpha\gamma c q'(p^m) > 0$$

Hence, if the demand elasticities of these two market segments are similar, the potential reduction in revenues from increasing the price (if demand is elastic) in the private insurance market segment is more than offset by the reduction in the rebate paid in the LIS market segment (which is similarly elastic).

The last conclusion is the main point delivered by the theoretical model. The reason why both market segments are linked is because pricing in the private market affects the amount of the rebate in the other. Revenues in each segment may move in the same or opposite directions depending on their elasticities; but it is only when LIS demand becomes perfectly inelastic that the rebate reduction effect dominates, thus triggering a price reduction in the private insurance market.[5] However, a perfectly inelastic demand is highly unlikely. The following expression shows that the key level of dissimilarity (low beta) leading to optimal price reductions depends

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[5] In the case where $\beta = 1$ (or the limit as it approaches 1). Equation (19) becomes negative. This occurs when LIS demand for prescription drugs is perfectly inelastic. In such an arguably implausible environment, increasing the price of drugs in the private insurance market decreases revenues in that segment beyond what would be optimal without regulation if demand is elastic, which it would be if the monopolist was maximizing profits and then increased prices. As the demand in the LIS segment is perfectly inelastic, a higher price in the private insurance market segment triggers an increase in the rebate because the rebate is a fraction of price, thus reducing the profits of the drug manufacturer. Consequently, it is preferable to lower the price. The reduction in profits in the private insurance market segment as we deviate from p^m is compensated for by a much sharper reduction in the rebate due in the LIS market segment.

on the relative size of price irresponsive demand in the LIS segment and marginal revenue of the private insurance market evaluated at the optimal prices without regulation.

(21)
$$\beta^* = \frac{q(p^m) + p^m q'(p^m)}{pq(p^m) + p^m q'(p^m) + \bar{z}} \in [0,1]$$

The sign of equation (20) determines whether the price of drugs for private insurance sponsors p increases or decreases after the introduction of a rebate. We have shown that this sign depends on the similarity of demands for prescription drugs in the different market segments (i.e., on the value of β). For $\beta = 0$, demands are alike across different market segments, and thus p will likely increase after the introduction of the rebate. The next question is whether this price increase will be more or less severe as the share of the market subject to a price rebate becomes more important. This is highly relevant because the suggested policy will increase the size of the market subject to rebate significantly. We thus need to figure out if prices will grow faster or slower as the share γ increases. In order to answer this question, we totally differentiate first-order condition (18) with respect to p and γ

(22)
$$\{2(1 - \beta\gamma)q'(p) + (p - c)(1 - \beta\gamma)q''(p) - \alpha\gamma[(1 - \beta)(2q'(p) + pq''(p))]\}dp$$
$$- \{\beta[(p - c)q'(p) + q(p) + \beta\bar{z}] + \alpha[(1 - \beta)(pq'(p) + q(p)) + \beta\bar{z}]\}d\gamma$$
$$= 0$$

Focusing on the case when demands are alike ($\beta = 0$) yields

(23) $\{2q'(p) + (p - c)q''(p) - \alpha\gamma[(2q'(p) + pq''(p))]\}dp - \alpha\{pq'(p) + q(p)\}d\gamma = 0$

which simplifies to

(24) $(1 - \alpha\gamma)\{[(2q'(p) + pq''(p))] - cq''(p)\}dp - \alpha\{pq'(p) + q(p)\}d\gamma = 0$

As before, we will evaluate this expression at $p = p^m$, that is, in the neighborhood of the equilibrium without rebate rule. Thus, as we did in deriving equation (19), the first-order profit maximization condition (14) evaluated at $\beta = 0$ ensures that $p^m q'(p^m) + q(p^m) = cq'(p^m) < 0$ and thus

$$(25) \qquad (1 - \alpha\gamma)\{[(2q'(p^m) + p^m q''(p^m))] - cq''(p^m)\}dp - \alpha cq'(p^m)d\gamma = 0$$

Next, notice that concavity of revenue in price ensures that the term in between brackets is negative, i.e., $2q'(p^m) + p^m q''(p^m) < 0$. This is a condition commonly assumed to ensure uniqueness of the monopoly and oligopoly pricing equilibrium. It suffices that demand is concave in prices, $q''(p^m) < 0$, to be fulfilled. However, concavity of demand in prices may turn ambiguous the sign of the term between braces because $-cq''(p^m) > 0$. The ambiguity disappears if marginal costs are nil, $c = 0$, demand is linear, $q''(p^m) = 0$, or simply not too concave relative to c, $|c| \ll |q''(p^m)|$. Since the marginal costs of production of pharmaceuticals are likely to be very close to zero, we will assume that $cq''(p^m)$ is small enough so that the overall term between brackets is negative. Thus

$$(26) \qquad \frac{dp}{d\gamma}\Big|_{p=p^m} = \frac{\alpha cq'(p^m)}{(1 - \alpha\gamma)\{[(2q'(p^m) + p^m q''(p^m))] - cq''(p^m)\}} > 0$$

Therefore, an increase in the share of the market subject to rebate will induce larger drug price increases in the private insurance market segment.

Now that we have described the forces behind the decision to increase or decrease the price in the private insurance market once the best price rebate is introduced, we should address several issues that could, in principle, call into question the validity of the presented model and its predictions.

4.2 Market Structure

It could be argued that this model is unrealistic because drug manufacturers are not monopolies, but rather compete against each other; prescription drug markets may be more complex than presented, because many prescription drugs face competition from therapeutic alternatives. There is still substantial market power in the drug industry. Frank (2012, pp. 9-11) documents this with respect to unique drugs. Duggan and Scott-Morton (2008) report that after the implementation of Medicare Part D most of the reduction in drug prices happened in therapeutic classes where generics were available. For all drugs without viable substitutes, the current model is directly applicable. For those situations where firms effectively confront competitors, the current model should be understood as a version of a Bertrand, differentiated products, oligopoly pricing scenario such that demands (1), (10), or (12) refer to the firm's residual demand function rather than to overall market demand. Depending on how close competitive drugs are determines the position of the residual demand (maximum potential market share) and its slope (maximum potential markup). Taking the demand of competitors as given, the direction of price movements are delineated by the current model. Evidently, the more competitive a particular drug market is, the less likely that the market will allow for prices to increase because in addition to reducing sales in the private insurance market segment and the size of the rebate, the drug manufacturer needs to consider the possibility of losing plan sponsors to the competition, thus further reducing revenues and profits. In this instance, reductions in revenue may be offset by reduced R&D or production.

4.3 Demand Elasticity

Assumptions about demand elasticities are perhaps the most substantial qualification of the model. Monopoly or oligopoly pricing requires that at the optimal equilibrium prices, demand is elastic. If, however, the market structure is more competitive, demand would be less elastic. This could be the case if we consider the vertically integrated nature of the industry, where pricing of insurance plans depends on prices negotiated for prescription drugs, the bargaining position of PBMs, and other large plan sponsors. Starting from an equilibrium, where demand is inelastic, produces the prediction of increasing prices in the private market as a way to increase sales and compensate for the loss of revenues in the LIS segment imposed by the rebate rule. Yet, this is not always the case. If LIS demand is perfectly inelastic, the increase in rebate following an increase in the price for private insurance will always offset the increase in revenues in the latter market segment. Thus, the optimal strategy when LIS demand is perfectly inelastic is to lower the price in other market segments. If demands, however, are similarly inelastic (with LIS demand being more elastic than that of private insurance), an increase in p_x will trigger a larger increase in revenues in the private insurance market segment than the increase in the rebate in the LIS segment. Last but not least, if demand in the non-LIS Part D segment is also inelastic, it makes sense to increase it as a way to approximate the pricing solution to the monopolist's, something that it is further facilitated by the fact that these prices (p_y) do not enter the computation of the AMP, and thus, do not impose any costs as rebates in the LIS segment.

4.4 Shared Markets and Quantity Discounts

The model presented here assumes that prices in market segments $x(p_x)$ and $z(p_z)$ are perfectly aligned through the rebate formula (9). In practice, plan sponsors operate in more than

one market segment, and negotiate bundling discounts involving more than one drug. Showing the direction of the incentives becomes more difficult, but the basic intuition remains. As long as demands are similar in the private insurance and LIS segments, there are incentives to increase prices following the introduction of a best price rebate rule. Evidently, the constraint defined by rebate rule (17) is now more loosely defined for each product individually as in fact, it is defined for the bundle. Suppose that only one LIS demand out of ten negotiated product prices are strictly inelastic. The rebate for this product will go up if the corresponding price in the private insurance market also increases, thus leading to a reduction in profitability. If the drug manufacturer had a choice, it would never increase such price. If discounts are negotiated for a bundle of drugs, prices might still increase if the profits generated by the other nine drugs compensate for the reduction in profits of this product with LIS inelastic demand. The share of this product matters. With bundling discounts, prices are more likely to increase the more similar demands in the private insurance and LIS segments are and the smaller is the share of perfectly inelastic demands in the LIS segment among the drugs of that negotiating basket.

4.5 Premiums versus Cost-Sharing

The model has addressed how the implementation of rebates may prompt drug price changes (i.e., the per-unit cost of medications). This is a variable cost item. In the case of the non-LIS Medicare Part D market, the quasi-defined benefit structure (i.e., actuarially equivalent to the benchmark plan) will impede changes in patient cost-sharing (i.e., coinsurance rates, and copayment amounts) and spending thresholds (i.e., deductible, initial coverage limit, catastrophic level) as ways for plan sponsors to respond to changes in underlying drug costs. Therefore, drug

price increases would more likely be reflected in higher plan premiums. This would impact insurance participation, but not prescription drug utilization.

The same cannot be said for private plan sponsors such as employers. Insurance plans aim to screen consumers with heterogeneous needs and different degrees of risk aversion. Competition among insurance providers would tend to lower copayments to align them with marginal costs of drugs, while premiums are kept as low as possible to cover only fixed costs (e.g., see Wilson, 1993, Section 6.7). Thus, it is likely that both patient cost-sharing and premiums would rise for private insurers, which will thus have a negative effect not only on participation but also in utilization—a matter that becomes quite important if reduced use represents non-adherence to medications for chronic disease.

5. Description of Policy Effects

Our theoretical model allows one to describe the effect of the proposed policy on drug prices in the private market. Specifically, if we assume the price elasticity of demand for prescription drugs is similar across market segments (i.e., $\beta = 0$), we can simplify first order equation (18) such that the optimal pricing with the rebate can be written as

$$(27) \qquad \frac{p^r - c}{p^r} = \frac{-(1 - \alpha\gamma)}{\varepsilon_x}$$

The key parameter for simulation purposes is γ, which is the share of the market subject to mandatory rebates. For the initial condition, the optimal price p_0^r must satisfy

$$(28) \qquad p_0^r \left[1 + \frac{1 - \alpha\gamma_0}{\varepsilon_x}\right] = c$$

Similarly, after the expansion of the market subject to the rebate (i.e., an increase in γ), the optimal price p_1^r must satisfy

(29)
$$p_1^r \left[1 + \frac{1 - \alpha\gamma_1}{\varepsilon_x} \right] = c$$

Because these two conditions need to be satisfied in equilibrium, we can equate them in order to compute the ratio of drug prices pre- and post-policy adoption, as

(28)
$$\frac{p_1^r}{p_0^r} = \frac{\varepsilon_x + 1 - \alpha\gamma_0}{\varepsilon_x + 1 - \alpha\gamma_1}$$

The proposed policy of imposing Medicaid-style rebates in the LIS market can be assessed by equation (28) and is reflected in the difference in the parameter γ pre- and post-policy.

The results of equation (28) vary depending on the share of prescription drug spending that falls under MDRP before and after imposing the rebate policy on the LIS segment of Medicare Part D, and the elasticity of demand for prescription drugs. Our model predicts price increases will ensue from the proposed policy, but the exact form of how the market will respond and the impact on patients remains an important question. As previously described, plan sponsors may prefer to increase patient cost-sharing in order to align member out-of-pocket (OOP) costs with the plan's marginal costs. However, under the standard Medicare Part D benefit, this may not be possible given the fixed plan design. Therefore, drug price increases are more likely to come as increases in premiums via the Medicare Part D bidding process. This may cause some Medicare enrollees to forgo Part D insurance. On the other hand, plan sponsors in the private market—which in the case of retirees would include plans which receive the retiree drug subsidy (RDS)—would have more flexibility in increasing member OOP costs, although premium increases are

still likely and therefore likely to reduce the proportion of the population with prescription drug insurance. Importantly, faced with higher copayments, patients may reduce consumption of essential medications for chronic disease, which may in turn lead to increased medical costs (Roebuck et al., 2011). Timely for the current analysis, the CBO (2012) recently announced that it now considers medical cost offsets from pharmaceuticals in its scoring of policies that might lead to changes in prescription drug utilization. A full accounting of implementing MDRP would incorporate reductions in drug utilization as well as reduced investments in R&D.

Given available estimates, it is likely that the demand for prescription drugs is fairly inelastic and not radically different across market segments (Goldman et al., 2007; Roebuck, 2012). Our model suggests that policies imposing mandatory rebates would cause negotiated discounts to decrease in the private insurance market, and perhaps—although less obviously— also in the non-LIS Part D sector. If AMP increases, so will the rebate and prices paid by Medicare for drug benefits for LIS beneficiaries. As long as payers' budgets can cope with this price increase, LIS beneficiaries will be immune, as their premium and copayments are very heavily subsidized. However, in the other two segments, premiums and potentially cost-sharing will increase to accommodate drug price increases. Consequently, prescription drug insurance coverage and prescription drug utilization will likely decline, as will the medical and productivity benefits realized from the management of chronic disease with pharmacotherapy. The actual impact of a mandatory rebate is complex; rebates may affect the prescription drug market by reducing rebates and discounts, or may be passed along to manufacturers in the form of reduced R&D. Additionally, while the model describes the impact on the overall prescription drug market, the actual impact on individual drugs may also depend on availability market share and of therapeutic alternatives.

6. Implications for Multiemployer Health Plans

6.1 Multiemployer Health Plans

Multiemployer plans which proliferated during and after WWI are subject to regulation under the Labor Management Relations Act of 1947, also known as the "Taft-Hartley Act" and the Employee Retirement Income Security Act (ERISA). By definition, a multiemployer plan is typically an employee pension or welfare plan created pursuant to a collective bargaining agreement covering workers of two or more unrelated companies (EBRI, 2009). Taft-Hartley plans (whether single or multiemployer), are required by law to provide that all assets, including employers' contributions, be held in a trust fund which is governed by a joint board of trustees made up of employer and union representatives, each with equal representation, and responsible for the overall operation and administration of the plan (IFEPB, 2012).

Multiemployer plans are one way of providing benefit security for a unionized workforce through pooling of risk and economies of scale. They are utilized most often in industries and geographic areas where several employers are covered by CBAs with one or more participating local unions, and can be particularly useful for those trades or industries in which the labor force may work for several employers during their career (e.g. construction, transportation, arts and entertainment, health care, mining, communication) (IFEPB, 2012).

Multiemployer plans can provide some unique advantages for both employers and beneficiaries. Foremost is the ability for mobile employees to earn and retain their benefits when working for various participating employers. Where a reciprocity agreement is negotiated, workers can also be covered by another industry associated multiemployer plan for temporary work in a different geographic location. The centralized administration of plans reduces

participating employer costs through economies of scale with the operating responsibilities being transferred to persons or firms specializing in the area. Smaller firms without the resources to administer their own plans are also able to provide employee benefits under the umbrella of a much larger entity with access to investment and consulting advice. Currently, benefits are provided tax-free to workers, employer contributions are tax deductible.

Plan contributions are made by employers that are signatory to the CBA. Participating companies usually make uniform contributions, typically based on units of work (hourly or weekly contributions are most common, although other bases for contributions exist); however, some large national or regional multiemployer plans offer different benefit levels which require different contribution levels. Barring these exceptions, cross-subsidization among employers— that usually contribute at the same rate for all employees who are at the same benefit level regardless of their actuarial costs—is one of the hallmarks of a multiemployer fund (EBRI, 2009). Investment earnings may also augment this pooled fund. In certain circumstances employees may be required or permitted to make additional contributions as well (e.g. during short unemployment periods or for 401k plans).

As of 2009, there were 1801 multiemployer health plans (94 "health benefits only" plans and 1701 "health and other benefits" plans). Multiemployer health benefit plans cover in excess of 20 million active and retired workers, their families, and survivors (DOL, 2012). Multiemployer plans tend to provide retiree medical coverage more often than private employer plans, and benefits, which are typically subsidized by the contributions made by active employees, and are considered rather generous. Consequently, the implementation of Medicare Part D (and the accompanying Retiree Drug Subsidy) was and continues to be of significant financial value to these funds. Multiemployer prescription drug plans for retirees are

overwhelmingly (72%) structured using the Retiree Drug Subsidy (Segal, 2012).[6] The average

benefit offered through trusts has an actuarial value of 87 percent of the minimum essential

coverage provisions of the Affordable Care Act, and many are even richer (NCCMP, 2011).

There are a variety of ways in which plan sponsors may fund health insurance coverage

offered to their workers. A fully-insured plan purchases a group health insurance policy or

contract from a state-licensed insurance carrier or a health maintenance organization (HMO). In

this arrangement, the insurance carrier assumes financial responsibility for covered benefit

claims and the associated administrative costs. Insurance premiums are transferred from the trust

fund to the insurance carrier. Alternately plans may also be classified as being self-insured.

Under this arrangement, the sponsor assumes the financial risks associated with health benefit

coverage. Self-insured multiemployer plans can either be responsible for their own

administration or may enter into a contract with a third party administrator to perform all

administrative duties. The financial risk may be borne either partially or entirely by the sponsor.

Partially self-insured plans, or mixed plans, may combine a group insurance policy to cover a

subset of health benefits. Self-insured plans may also purchase stop-loss insurance to protect

against unexpectedly large claims by pre-determining an attachment point (per individual or

aggregate) beyond which amount the plan is not liable.

According to the Department of Labor (2012), in 2009, approximately 46 percent (828)

of multiemployer plans were self-insured, while 14 percent (250) provided fully insured health

benefits. The remaining 723 plans (40 percent) were mixed-insured. This is in contrast to 58

percent of single employer health plans providing fully insured health benefits.

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[6] It is also worth noting the RDS plans do not benefit from the 50% donut-hole discount that Medicare PDP/MAPD
plans now enjoy.

Most multiemployer plans, and virtually all of larger plans, are self-funded (NCCMP, 1997). The main advantage of this option is the combination of cash flow and premium tax advantages available to plans, as well as reduced administrative costs associated with insurance companies (Goebel, 2000). Additionally, self-insured plans are also exempt from certain federal and state legislation pertaining to benefit plan requirements. However, some smaller and mid-size plans often find themselves overextended by assuming more insurance risk. Maintaining adequate cash reserves and purchasing stop-loss insurance may be insufficient to protect against rapid inclines in healthcare costs or during a prolonged economic recession. The most glaring drawback of self-funding is, of course, the lack of access to the health networks, provider discounts and negotiated rebates available through HMOs and PBMs. However, managed indemnity plans through preferred provider organizations (PPO) may offer a middle of the road approach allowing more choice than an HMO, as well as negotiated network discounts (Goebel, 2000). Moreover, almost all multiemployer plans access provider discounts through directly contracting with providers or insurers to "rent" their networks, or by participating in purchasing coalitions to negotiate volume based network access for better prices on prescription drugs.

6.2 Challenges for Multiemployer Health Plans

Multiemployer health plans have been faced with a number of challenges in recent years. Most evident, is the rising cost of health care coverage. As the annual rate of health care expenditures continues to outpace inflation, many plans find themselves digging deep into their health plan reserves. The impact of greater expenses is somewhat magnified considering that fund contributions have been declining. This may be due to a reduction in working hours as a result of the economic slowdown or because the number of retirees is growing faster than the

number of active participants. The economic recession has also limited the ability of funds to raise income through investment markets (McSweeney et al., 2009).

Cost shifting has been another influential factor for multiemployer plans. The federal government achieves cost savings in public health insurance programs at the expense of other private plans. Our theoretical model demonstrates how this occurs, for instance, in the context of imposing a price regulation in the prescription drug market. As another example, reductions in payment rates for Medicare and Medicaid providers tend to be recouped from privately insured patients. One report by an actuarial consulting firm estimated that almost $89 billion was cost-shifted to commercial health plans in 2007 because of Medicare and Medicaid underpayments (McSweeney et al., 2009). Stated differently, employers faced an additional annual burden of $1,115 for a covered family of four and nearly $77 more for the family in terms of increased premiums, coinsurance and deductibles. Thus, a Medicaid style rebate would add to the cost shifting that is already being born by multiemployer plans.

There is considerable uncertainty surrounding the future of multiemployer health plans with the passage of the Patient Protection and Affordable Care Act (PPACA) of 2010. Under PPACA, the threshold dollar limitation for multiemployer health plans will be $27,500 per family. Starting from 2018, a 40 percent excise tax will be imposed for "excess benefits" beyond the threshold amount. Because multiemployer health plans tend to be more generous (and therefore, more costly), many plans will need to modify their coverage or be taxed accordingly (Secunda, 2011). Additionally, with the continuing trend in cost shifting to private payers, there is a greater chance that multiemployer plans may see their contributions rise to levels beyond threshold amounts.

Multiemployer plans must also comply with healthcare market reform measures under the PPACA. These include provisions relating to: uniform explanation of coverage, loss-ratio reports and rebate premiums, excessive waiting periods, lifetime limits, annual limits, pre-existing health condition exclusions, and the extension of dependent coverage to age twenty-six (Secunda, 2011). All of these are expected to put an upward pressure on costs. Additionally, the PPACA also mandates certain minimum essential coverage requirements from 2014 onwards. Statutorily–required minimum essential benefits packages may undermine the ability of multiemployer health plans to provide cost effective benefits.

The creation of health benefit exchanges is also potentially problematic for multiemployer health plans. Individuals and small businesses with up to 100 employees may purchase qualified health coverage through these exchanges. Instead of joining a multiemployer plan and worrying about withdrawal liability, smaller employers might decide not to provide health coverage, pay an excise tax, and let their employees get health coverage through these exchanges (Secunda, 2011). Federal tax credits will also be available for low-income individuals without employer coverage who purchase insurance offered through state exchanges. Hence, there may be employers that abandon coverage for their low-income workers, which in turn affect employer contributions to trusts (NCCMP, 2011). It is thus likely that the PPACA will impose many divergent effects upon multiemployer health plans.

6.3 Implications of Proposed MDRP Policy for Multiemployer Retiree Health Plans

As we have described in detail, applying the Medicaid Drug Rebate Program to LIS enrollees will likely increase drug prices in the private market and also perhaps in the non-LIS segment of Medicare Part D. This incline in prescription drug costs—for all employees in all

multiemployer plans—will likely become a source of additional friction between employers and unions in the collective bargaining process. Who will pay for this increase? Employers will seek offsetting reductions in wages, benefit contributions/generosity, or some combination of the two. Any decline in pay would be significant considering wages have been virtually stagnant in recent years. Additionally, rising health care costs, and new federal requirements for health care plans under PPACA, and significant new funding targets for multiemployer defined benefit plans combine to place additional pressures on health plans and employees that would exacerbate any decline in wages.

If wage rates are maintained, then benefits would be altered either through reduced fund contributions or through changes in plan design. As noted earlier, multiemployer prescription drug plans for retirees are overwhelmingly structured using the Retiree Drug Subsidy.As previously discussed, these plans are more likely to respond to higher drug prices by increasing patient cost-sharing, which would adversely affect medication adherence prompting higher medical costs (Roebuck et al., 2011). Furthermore, employers should also expect reduced productivity among active union workers as a consequence of poor medication adherence (Carls et al., 2012).

To summarize, switching LIS Medicare enrollees to Medicaid drug pricing is a classic example of cost shifting. The government will save money on prescription drug insurance for LIS enrollees, but the private sector will pick up much of the tab. Under the proposed policy, private sector prescription drug and medical care costs will increase, as will the cost of providing health insurance. This will put pressure on the parties in the collective bargaining process to maintain current wages and benefits, and the productivity of their members.

7. Conclusion

In this report, we have assessed the impact of policies proposing to impose the prescription drug pricing regime that governs Medicaid to Medicare LIS beneficiaries. Our results indicate that this policy will likely lead to higher prescription drug prices in the private sector at the expense of reducing the cost of the Medicare Part D program—although even this result is not definitive since prices in the non-LIS Medicare segment might also rise and offset some of the LIS savings. These price increases will lead to higher insurance premiums and higher out-of-pocket costs, which will in turn result in fewer private sector employees having prescription drug insurance. Moreover, the savings from implementing the Medicaid Drug Rebate Program in the LIS segment of Medicare Part D may not take into account offsetting medical costs from worsening medication adherence (Roebuck et al., 2011; CBO, 2012b).

There are additional repercussions of the policy. Increases in prescription drug and other health care costs will put pressure on private sector employee pay, and will result in slower growth in wages and employment (Baicker and Chandra, 2006; Cutler and Madrian, 1998). Given the current stagnation in wages, any additional slowing seems particularly undesirable. Worker productivity is also likely to be adversely affected by declining health caused by reduced prescription drug use (Bhattacharya and Lakdawalla, 2006; Carls et al., 2012). Here too, in the midst of a prolonged period of slow economic growth, any erosion of worker productivity seems very unwanted.

Overall, while switching Medicare LIS enrollees to Medicaid prescription drug pricing may help the federal government's current fiscal balance sheet, the long term consequences of such a policy may be significantly harmful to the economy and private sector employee health. The clear shifting of the costs of such a policy from the public to the private sector provides

legitimate reason to rethink the wisdom of the plan. Indeed, any initial savings to the federal

government will likely be offset by higher expenditures in other areas as well as forgone

investment in new R&D.

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