

CONTAGION OF MASS WITHDRAWALS FROM MULTIEMPLOYER PENSION PLANS

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SUMMARY

The Pension Benefit Guaranty Corporation (PBGC) insures millions of participants in roughly 1,400 multiemployer defined benefit (DB) pension plans against loss of some or all benefits in case their plan is unable to pay benefits. Multiemployer plans are funded by participating employers, and a particular hazard to a plan's solvency is the potential for all participating employers to collectively withdraw from the plan. While such mass withdrawals have been relatively infrequent to date, some stakeholders are concerned that a mass withdrawal at one plan may trigger additional mass withdrawals at other plans. This report illustrates the potential for contagion by mapping out shared ties (and financial risks) among plans that have already experienced a mass withdrawal and multiemployer plans in general. We develop a theoretical framework that could be used to model contagion effects.

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1. INTRODUCTION

In order to monitor the solvency of its insurance operations, the PBGC's Policy, Research and Analysis Department (PRAD) developed a system of connected models—the Multiemployer Pension Insurance Modeling System (ME-PIMS)—to forecast revenues, expenses, and related metrics related to multiemployer plans. An important predictor of multiemployer plan insolvency is the possibility that all employers collectively withdraw from the plan. While such mass withdrawals have been relatively infrequent to date, some stakeholders are concerned that a mass withdrawal at one plan may trigger additional mass withdrawals at other plans. ME-PIMS does not currently address that type of contagion of mass withdrawals. The PBGC contracted with Advanced Analytical Consulting Group (AACG) to investigate potential modeling of contagion of mass withdrawals in ME-PIMS. This document reports on our review of specific priority areas.

Section 2 starts by mapping out the ties among plans that already experienced a mass withdrawal. The history on mass-withdrawn plans and their connections is sparse, but worthwhile to evaluate for insight and learning. Section 3 expands the effort undertaken in Section 2 to map ties among all multiemployer plans to gauge the potential for contagion. Plans can be linked by a common industry, common contributing employers and, in some cases, multiple sets of common contributing employers. Section 4 strives to augment the empirical research in the previous sections with first-person, first-hand experience dealing with multiple deteriorating multiemployer plans. Section 5 describes a potential theoretical framework that combines individual decision making with information-driven contagion forces that can be modeled into ME-PIMS.

2. TIES AMONG MASS-WITHDRAWN PLANS

According to a list provided by the PBGC, 40 multiemployer plans experienced a mass withdrawal between October 2011 and July 2018. This section documents links among those 40 multiemployer plans.

First consider clustering by industry. The first three columns of Table 1 show the distribution of plans over industry sector, separately for plans that did not experience a mass withdrawal and for plans that did.¹ A Pearson Chi-square test strongly rejects the hypothesis that mass withdrawals occurred independently from industry sector ($p < .001\%$). The last column calculates the fraction of plans within each industry that experienced a mass withdrawal. On average, $40 / 1,472 = 2.7\%$ plans did over seven years, but the percentages vary widely and are sensitive to small numbers of plans.²

¹ Throughout this report, plans with zero participants at both the beginning and end of the reporting period are excluded from the analysis. Table 1 further excludes one plan for which industry sector was unknown. The table relates to the most recent filing since 2011. Some plans, including two mass-withdrawn plans, stopped filing prior to 2017.

² French (2017) reviewed 16 recent mass withdrawals, noting that “plans in Construction and Entertainment had by far the lowest incidence of mass withdrawal, and those in Manufacturing and Retail had the highest incidence rates.” Our results for Construction, Entertainment, and Manufacturing are consistent with his. (Entertainment is included in Other Services; we identified 33 Entertainment plans, none of which had mass withdrawn.) Unlike French, we found that the mass withdrawal rate in Retail Trade (2.3%) was roughly in line with the overall average (2.7%). Special withdrawal rules apply for plans in the Construction and Entertainment industries (29 U.S. Code §1383), which may imply that all employers withdrew from some of those plans without being recorded as a mass withdrawal.

Table 1. Distribution of Plans over Industry, by Whether They Experienced a Mass Withdrawal (Most Recent Filing)

	Mass withdrawal?		Total	Percentage with mass withdrawal
	No	Yes		
(A) Ag/Forestry/Fishing	11	0	11	0.0%
(B) Mining	5	0	5	0.0%
(C) Building Construction	83	0	83	0.0%
(D) Heavy Construction	62	1	63	1.6%
(E) Plumbing Heating A/C	153	1	154	0.6%
(F) Electrical Contractors	123	0	123	0.0%
(G) Bldg Finishing Contrs	69	0	69	0.0%
(H) Found Struct Exterior	158	1	159	0.6%
(J) Other Construction	122	1	123	0.8%
(K) Food Beverage Tobacco	29	1	30	3.3%
(L) Apparel Textile	6	0	6	0.0%
(M) Paper Manufacturing	4	1	5	20.0%
(N) Printing And Related	17	6	23	26.1%
(O) Furniture And Related	4	1	5	20.0%
(P) Machinery	3	2	5	40.0%
(Q) Electrical Equipment	8	0	8	0.0%
(R) Other Mfg	63	4	67	6.0%
(S) Truck Trans	74	4	78	5.1%
(T) Water Trans	41	2	43	4.7%
(U) Other Transport & Utils	24	1	25	4.0%
(W) Information	31	3	34	8.8%
(X) Wholesale Trade	21	3	24	12.5%
(Y) Retail Trade	85	2	87	2.3%
(Z) Fin,Ins,RE	20	0	20	0.0%
(Z1) Administrative Svces	43	3	46	6.5%
(Z2) Health/Social Assist	18	0	18	0.0%
(Z3) Accomodation/Food Svces	27	0	27	0.0%
(Z4) Other Services	128	3	131	2.3%
Total	1,432	40	1,472	2.7%

Source: PBGC, Form 5500 filings.

Next consider potential contagion related to common contributing employers. Data limitations permit only a subset of contributing employers to be identified: Schedule R of the Form 5500 generally lists only employers that contributed at least 5% of total plan contributions. Our mapping of common contributing employers is therefore limited to such "significant contributors." Schedule R lists the name and Employer Identification Number (EIN) of significant contributors; we match them by both, where name is normalized so that spelling and legal variations are recognized (e.g., *ABC, ABC Inc, ABC, Inc., ABC LLP, ABC USA, and ABC Holdings* all match).

The 40 plans that experienced a mass withdrawal consisted of 22 singleton plans, i.e., plans whose significant contributors did not contribute significantly to other plans. The remaining 18 plans had ties to other plans through one or more common significant contributors. Figure 1 depicts the 40 mass-withdrawn plans (inside the large circle) and the other plans to which they are connected (outside the large circle). Double (triple) connector lines represent two (three) common significant contributing employers. The colors of the circles indicate each plan's financial risk

status, ranging from neither endangered nor critical (green) to currently receiving assistance from the PBGC (black). For mass-withdrawn plans, the risk status refers to the year in which the mass withdrawal occurred; for the others, it refers to the most current period for which a Form 5500 filing is available.

Figure 1. Mass-Withdrawn Plans and Their Connections through Common Significant Contributors

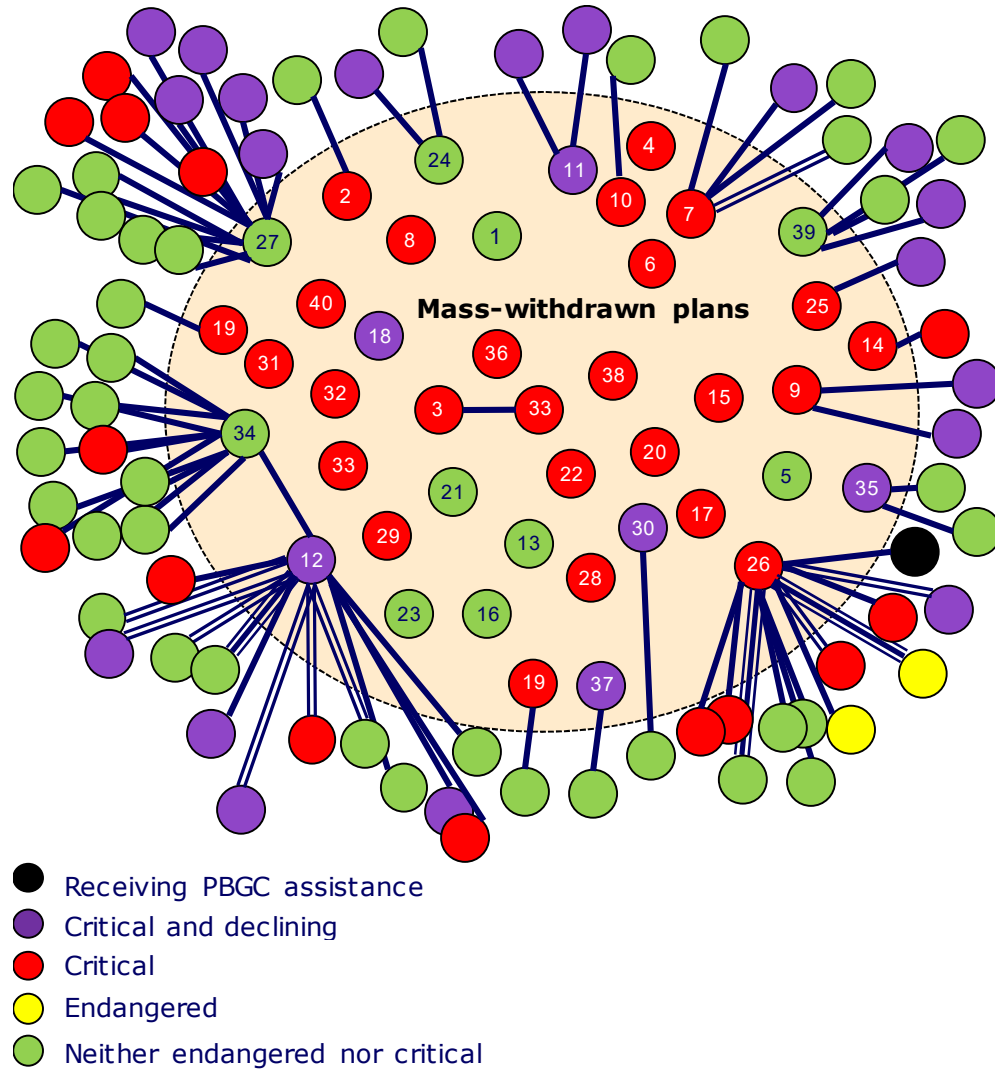


Figure 1 illustrates several issues.

1. First, while six of the 40 plans that mass-withdrew were in critical and declining status (purple circles), most were financially stronger: 24 plans were in critical status (red circles) and 10 were even in neither endangered nor critical status (green circles).³ This raises questions about the potential

³ Critical and declining status (purple) was introduced on the Form 5500 in 2015, i.e., plans that experienced a mass withdrawal prior to 2015 could not be in the

- perception that mass withdrawals tend to occur in financially weak plans. That said, a mass withdrawal does tend to foreshadow the need for the PBGC to step in; based on the most recently available information (not shown in Figure 1), 34 of the 40 mass-withdrawn plans are currently receiving PBGC assistance, and five of the remaining six experienced the mass withdrawal only recently. (The exception is a plan whose participating employers mass-withdrew in 2012; it initially deteriorated, but recovered and is currently in the green zone.)
2. Second, only two pairs of mass-withdrawn plans share a common significant contributor: Plans 3 and 33 have one contributor in common, as do plans 12 and 34.⁴ In other words, there is little historical evidence that a mass withdrawal may trigger the mass withdrawal of a related plan, at least insofar relations are measured through common contributing employers. The mass withdrawals of plans 3 and 33 took place six months apart during 2014, whereas the mass withdrawal of plan 34 (February 2013) preceded that of plan 12 (December 2016) by almost four years.
 3. Third, while only two pairs of mass-withdrawn plans share a contributing employer, many more ties exist with plans that remain operational.⁵ Further strengthening ties, some plans shared two or three significant contributors. In other words, many employers that used to contribute to a plan that experienced a mass withdrawal are currently contributing to other plans, raising the potential for contagion.

We close this section with two observations to place the incidence and consequences of mass withdrawals in context.

Between October 2011 and July 2018, 40 multiemployer plans experienced a mass withdrawal, i.e., on average approximately six mass withdrawals per year. For reporting periods ending in 2017, 1,378 multiemployer plans filed a Form 5500. Mass withdrawals thus affected roughly $6/1,378 = 0.4\%$ of multiemployer plans per year. For comparison, roughly 0.8% of single-employer plan sponsors filed for bankruptcy each year. In other words, mass withdrawals are not common, and their incidence is roughly half that of corporate bankruptcies. Contagion of mass withdrawals has been very limited in recent history.

Based on computer code provided by the PBGC, we estimate that the PBGC provided financial assistance to at least 115 plans in 2017. Above we found that 34 of the 40 mass-withdrawn plans are among those 115 plans, i.e., 81 plans (70%) are receiving assistance without having experienced a mass withdrawal. This is an overestimate, since we only accounted for mass withdrawals since 2011. Still, it appears that mass

purple zone. The data contain 16 plans that mass-withdrew in 2015–2018; three were in the green zone, seven in the red zone, and six in the purple zone.

⁴ Not only do these plan-pairs share a contributing employer, they are also in the same industry: Information (plans 3 and 33) and Truck Transportation (plans 12 and 34).

⁵ Plan 26, which experienced a mass withdrawal in September 2012, is tied to a plan that has long received PBGC assistance after mass withdrawing in February 2001. One could consider this pair as potentially reflective of contagion, but the lag—more than 11 years—was quite long.

withdrawals are by no means the only route to financial assistance, and quite possibly not even the most common route.

3. TIES AMONG MULTIEMPLOYER PLANS

We now turn to quantitative evidence on ties among multiemployer plans, irrespective of any mass withdrawal. The purpose of this exercise is to gauge the potential for contagion, should a mass withdrawal occur. As in the previous section, the focus is on common industry ties and on common significant contributing employers. We further document the financial strength of connected multiemployer plans.

Common Industry

Table 2 documents the number of plans and plan participants in the main industry sectors (Construction, Retail, Transportation, and Other). More than one-half of plans (53%) are in the Construction industry, and they cover 36% of participants in multiemployer plans. Plans in the Retail and Transportation sectors cover 14% and 15% of participants, respectively.

Table 2. Plans, Participants, and Funding by Industry Sector (2017)

	Number of Plans		Number of Participants		Aggregate Funded Ratio	Unfunded Liabilities (\$bn)
	Count	Percent	Count (m)	Percent		
Construction	730	53.0%	3.85	36.3%	43.1%	317.3
Retail	80	5.8%	1.53	14.4%	41.6%	46.4
Transportation	140	10.2%	1.57	14.8%	40.5%	132.2
Other	428	31.1%	3.65	34.4%	42.6%	156.2
Total	1,378	100.0%	10.59	100.0%	42.4%	652.1

Source: Form 5500 filings.

Administrators and trustees of multiemployer plans may be expected to closely watch developments around other plans in their industry. As discussed in the previous section, mass withdrawals have been limited, and spill-over effects of mass withdrawals to other plans have been rare. However, based on the large numbers of plans in each industry, the potential for future contagion to other plans within the same industry is present.

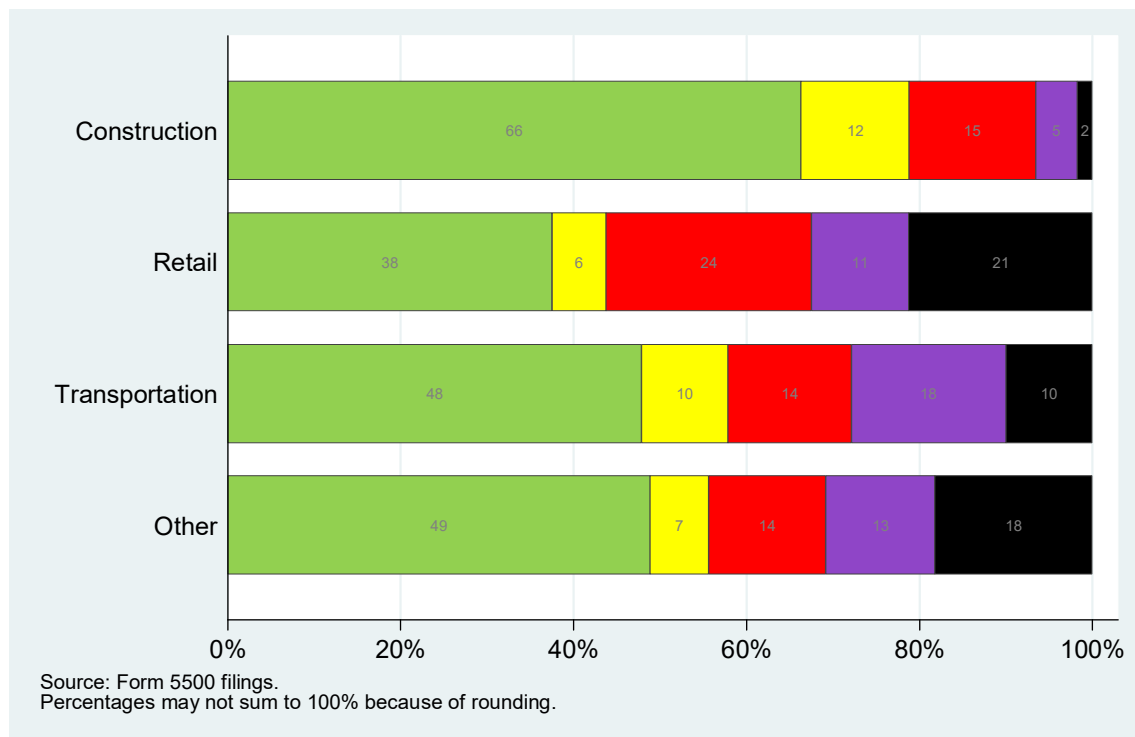
Table 2 also shows the aggregate funded ratio, defined as the ratio of total assets to total liabilities. (It is an aggregate ratio, not an average of plan-specific funded ratios.) Assets and liabilities are based on Schedule MB lines 2a (current value of assets) and 2b(4) (RPA '94 current liability).⁶ In the aggregate, plans are funded at 40%–43% of liabilities in each of the four sectors. Total unfunded liabilities, defined as the difference between liabilities and assets, are \$317 billion for Construction plans, \$46 billion for Retail plans, \$132 billion for Transportation plans, and \$156

⁶ Plans that did not file a Schedule MB in 2017 are included in the number of plans and participants, but their assets and liabilities are excluded from the table. Lack of a Schedule MB generally indicates that the plan is receiving PBGC assistance.

billion for Other plans. In other words, the financial consequences of a potential cascade of mass withdrawals would be dire.

The following graphs shed light on the financial status of plans in each of the four industry sectors. Figure 2 shows the plan-level distribution of risks status. Construction plans are relatively healthy, with two-thirds in the green zone and only 2% currently receiving PBGC assistance. At the other end of the spectrum are Retail plans, with just 38% in the green zone, 35% in critical or critical and declining status, and 21% currently receiving PBGC assistance. (A small number of plans are seriously endangered; they are combined here with the endangered category.)

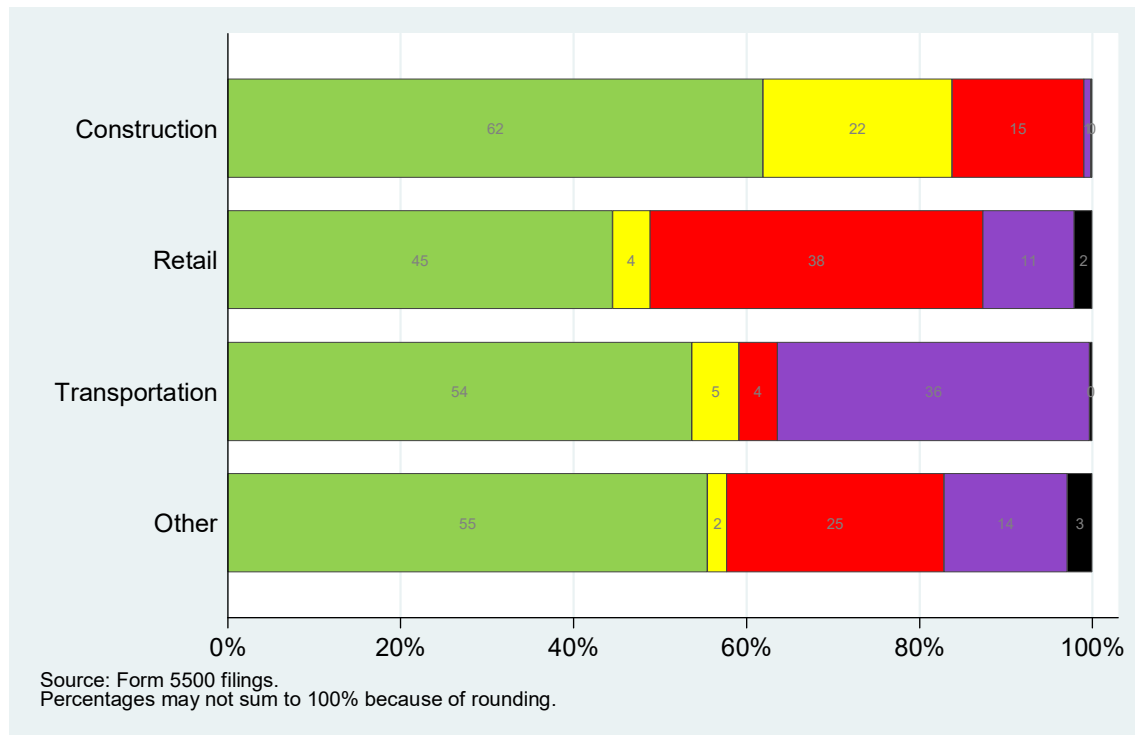
Figure 2. Distribution of Risk Status, by Industry (Weighted by Plans, 2017)



Similarly, Figure 3 shows the distribution of risk status, weighted by plan participants. Construction plans are again relatively financially strong. Separately, the black slices are thinner than at the plan level, suggesting that PBGC-assisted plans are below-average in size. Indeed, while the 122 PBGC-assisted plans comprise 8.9% of all multiemployer plans, they cover only 1.5% of total participants.⁷

⁷ For this purpose, plans that did not file a Schedule MB are assumed to be receiving PBGC assistance. There were seven such plans in 2017. Four had recently experienced a mass withdrawal, two others reported zero contributing employers, and the remaining plan is very small, with just nine participants.

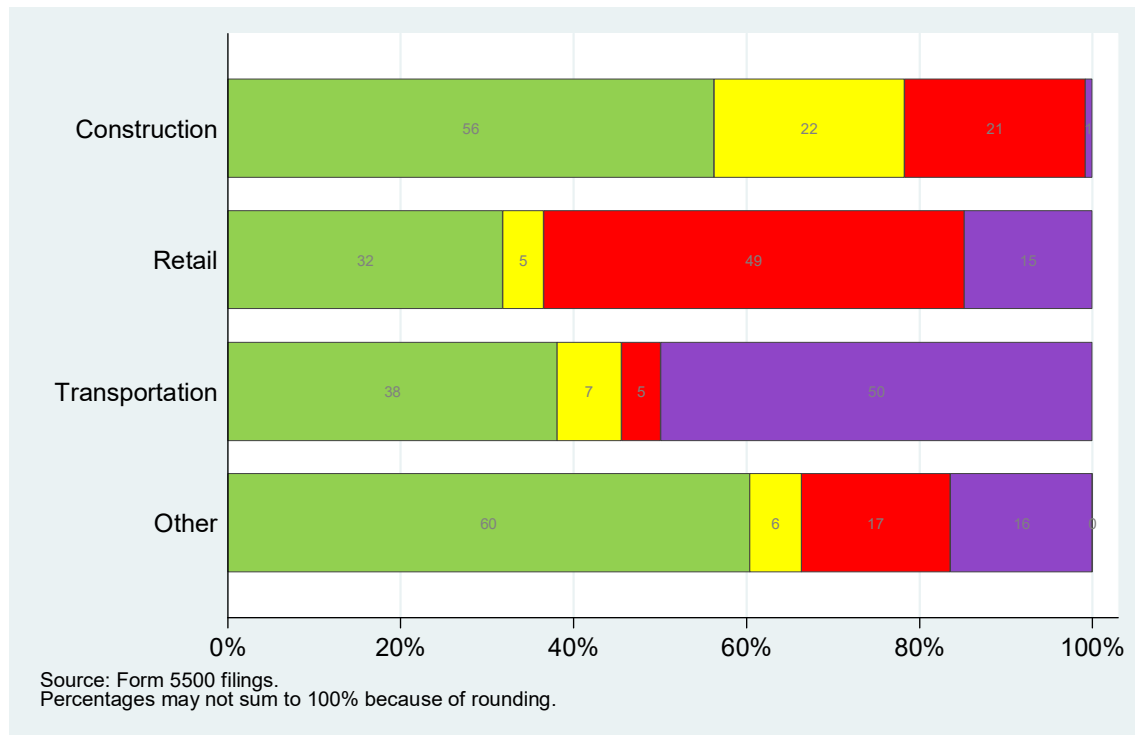
Figure 3. Distribution of Risk Status, by Industry (Weighted by Plan Participants, 2017)



Finally, Figure 4 shows the distribution of risk status, weighted by unfunded liabilities.⁸ The general pattern is consistent with Figure 2 and Figure 3, with relatively few Transportation plans and relatively many Retail plans in critical or worse status. However, these patterns hide the severity of potential plan failures, as discussed next.

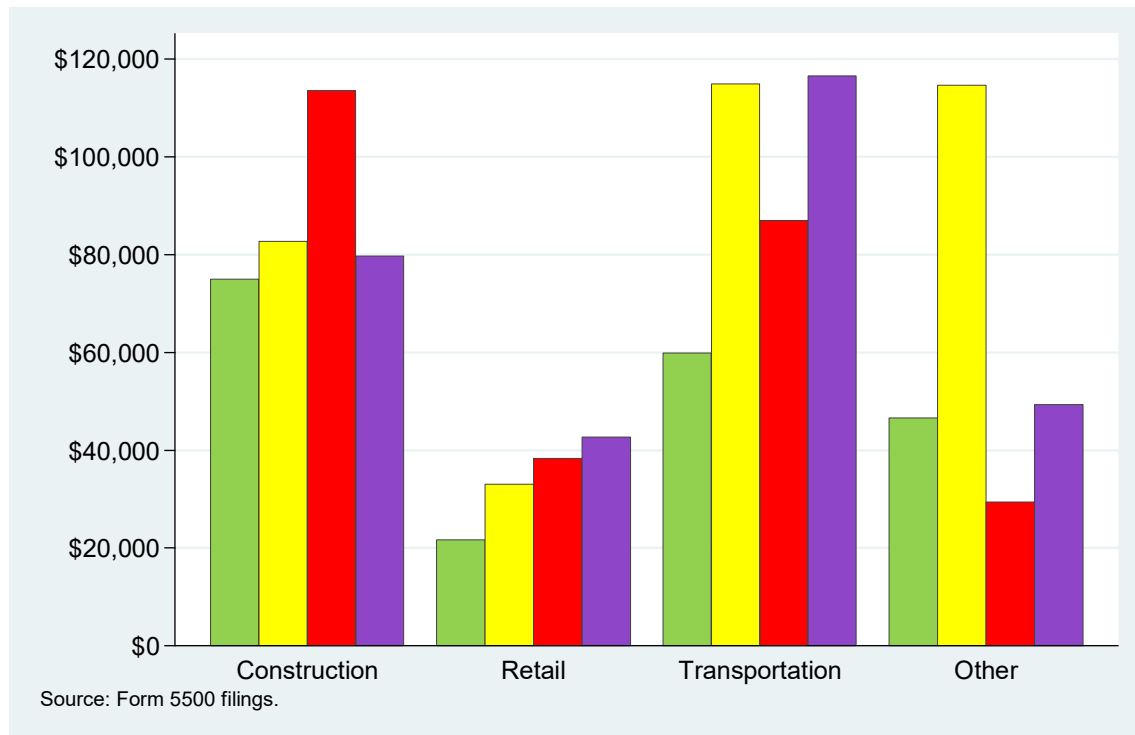
⁸ Recall that this metric is based on Schedule MB, which is rarely filed by plans that are receiving PBGC assistance. As a result, the black-colored fraction of unfunded liabilities is negligibly small.

Figure 4. Distribution of Risk Status, by Industry (Weighted by Unfunded Liabilities, 2017)



Consider again participants and unfunded liabilities by industry (Table 2). Per-participant unfunded liabilities vary substantially across industries. They further vary by risk status, as shown in Figure 5. While the figures above suggest that plans in the Retail sector are in relatively weak financial health, their per-participant unfunded liabilities are lower than that in the Construction and Transportation sectors. For example, per-participant unfunded liabilities of plans in critical or worse status are about \$112,000 (Construction), \$39,000 (Retail), \$113,000 (Transportation), and \$37,000 (Other).

Figure 5. Per-Participant Unfunded Liabilities, by Industry and Risk Status (2017)



Common Contributing Employers

Multiemployer plan contagion may further arise when multiple plans share the same contributing employers. As explained above (page 5), Schedule R identifies the EIN and name of employers that contributed significantly (5% or more of the total). This section provides more detail on such employers and the ties they create among multiemployer plans.

On average, the 1,378 multiemployer plans in the analysis listed 3.4 significant contributors; 212 plans did not list any significant contributor. The total number of unique contributors was 3,500. Table 3 shows the number of multiemployer plans to which any employer contributed.

Table 3. Number of Multiemployer Plans in Which Significant Employers Participate (2017)

Number of plans	Frequency	Percent
1	2,970	84.9%
2	338	9.7%
3	89	2.5%
4	45	1.3%
5	26	0.7%
6	11	0.3%
7	5	0.1%
8	6	0.2%
9	2	0.1%
10	1	0.0%
11	1	0.0%
12	3	0.1%
25	2	0.1%
33	1	0.0%
Total	3,500	100.0%

Source: Form 5500 filings.

Most employers (2,970 employers, or 84.9%) contributed significantly to only one multiemployer plan. The remaining 530 employers contributed to at least two and as many as 33 different plans, thereby generating links among those plans that may elevate susceptibility to multiemployer contagion effects.

Consider pairs of plans with a common contributor. As shown in Table 3, 338 employers contributed to two plans each and thus generated 338 plan-pairs. Also, 89 employers contributed to three plans each, thereby generating $89 \times 3 = 267$ plan-pairs.⁹ In total, employers that contributed to multiple plans generated 2,781 plan-pairs. Some of those pairs are duplicates. For example, both employers X and Y may have contributed to plans A and B. Since plan-pair A-B has two contributors in common, its ties may be stronger than those of a plan-pair that appears only once. The number of common contributors may thus be a measure of a plan-pair's susceptibility to multiemployer contagion. Table 4 shows the distribution of number of contributors to unique plan-pairs.

⁹ Suppose an employer contributed to plans A, B, and C. These form three plan-pairs (A-B, A-C, and B-C). More generally, k plans with a common contributor generate $k(k-1)/2$ plan-pairs.

Table 4. Number of Employers Contributing Significantly to the Same Pair of Plans (2017)

Number of employers	Frequency	Percent
1	2,568	92.3%
2	154	5.5%
3	43	1.5%
4	14	0.5%
5	2	0.1%
Total	2,781	100.0%

Source: Form 5500 filings.

Most plan-pairs (92.3%) have only a single common significant contributor, but $154+43+14+2 = 213$ plan-pairs share multiple contributors. Two pairs share as many as five contributors each.¹⁰

Contagion risks may depend not only on the intensity of ties across plans (Table 4), but also on their financial strength. Table 5 shows the distribution of financial strength of plan-pairs with one or more common contributors. The plurality of plan-pairs (33.7%) consist of two plans that both are in neither Endangered nor Critical status (the "Green" zone). To the extent that mass withdrawals (and thus contagion) is linked to poor financial health, then contagion risks are particularly elevated for plan-pairs in which both plans are financially weak, i.e., the entries in the lower portion of Table 5.

¹⁰ The first plan-pair with five common contributors are sponsored by unions for electrical workers, i.e., in the Construction industry. The second plan-pair with five common contributors are sponsored by the same union for newspaper workers, and both plans are in the Information (Other) industry. Both quintuple-connected plan-pairs consist of a green-zone and a purple-zone plan.

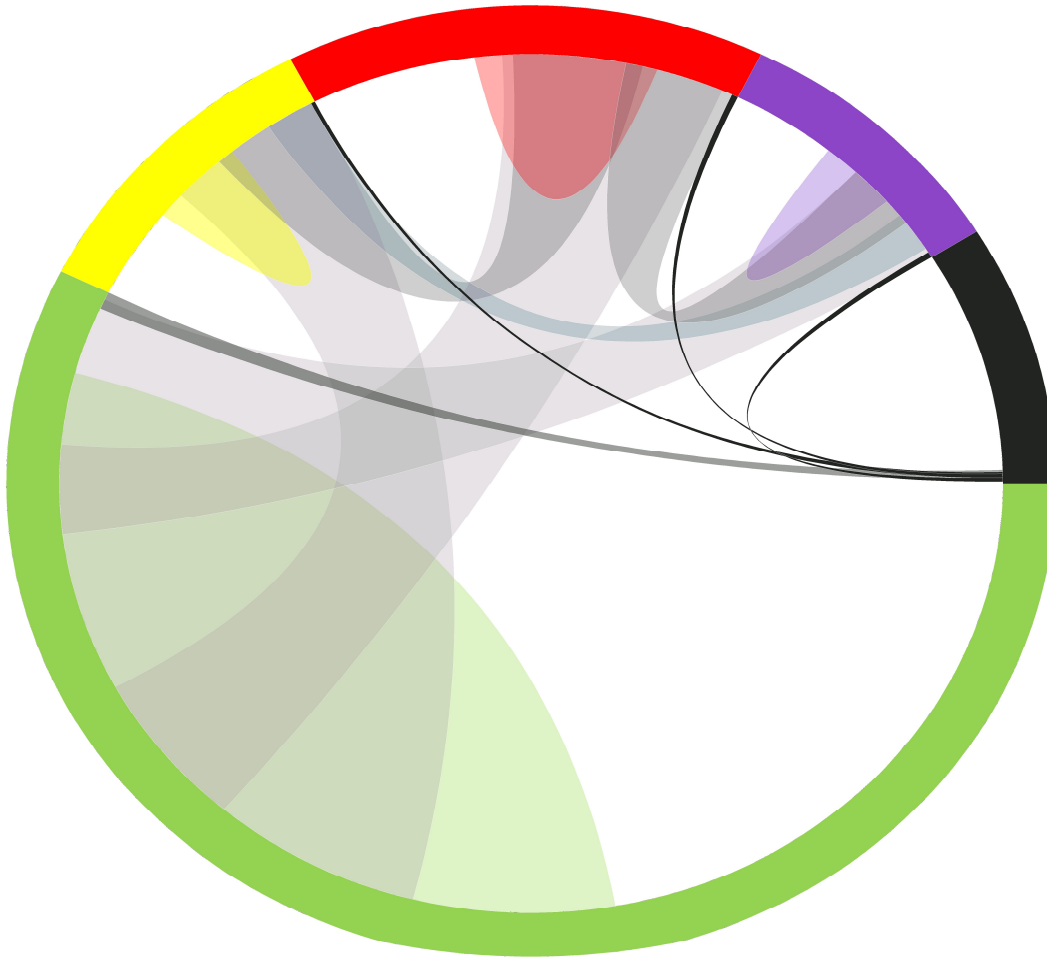
Table 5. Risk Status of Plan-Pairs with a Common Significant Contributor (2017)

Risk Status of Connected Plans		Number of Plan Pairs	Percent
Green	Green	937	33.7%
Green	Yellow	383	13.8%
Green	Red	643	23.1%
Green	Purple	226	8.1%
Green	Black	9	0.3%
Yellow	Yellow	54	1.9%
Yellow	Red	172	6.2%
Yellow	Purple	40	1.4%
Yellow	Black	3	0.1%
Red	Red	160	5.8%
Red	Purple	101	3.6%
Red	Black	3	0.1%
Purple	Purple	47	1.7%
Purple	Black	3	0.1%
Total		2,781	100.0%

Source: Form 5500 filings.

Also see Figure 6, which graphically represents the information in Table 5. In addition to depicting the contributor linkages between plans of different risk types, it also shows the proportion of plans that are not affected by linkages.

Figure 6. Connections across Plans through Common Significant Contributors (2017)



4. INTERVIEW WITH A MULTIEMPLOYER PLAN TRUSTEE

In order to understand what types of concerns arise due to unfunded liabilities, we interviewed the former treasurer at a well-known contributing employer and current trustee of several of the nation's largest multiemployer plans. In his various roles, he was and is responsible for approving funding, monitoring unfunded liabilities and estimating potential future losses in benefits to participants. As a representative of one the key contributing employers of several multiemployer plans, our interviewee brings first-hand perspective to the issues at hand.

Employer's Access to and Cost of Funding

In the interviewee's case, unfunded liabilities had an adverse impact on his employer's access and cost of capital. In his capacity as the treasurer, he met with all three major credit rating agencies twice a year to apprise them of the contributing

employer's exposure to multiemployer plans. This exposure had a substantial impact on the financial metrics used to determine the credit rating of the employer.

This observation is independently supported by industry research conducted by us. We find that as the unfunded pension liability of plan contributors increases, they face capital funding issues in the form of credit downgrades and specific restrictions in the form of covenants required by lenders. Both these actions are publicized by a ratings agency (typically behind a paywall) or by the contributors in regulatory filings to the Securities and Exchange Commission (SEC).

The three major credit ratings agencies —Fitch Ratings, Inc., Moody's Investors Service, Inc., and S&P Global Ratings—all take into account a contributor's multiemployer pension obligations when determining a credit rating. A review of historical credit rating changes for companies with the largest exposure to pension obligations (measured as contributions as a percentage of Cash Flow from Operations) shows that pension exposure is accounted for in credit ratings and thus affects the cost and availability of capital.

We also find that lenders typically include multiemployer plan-related provisions to ensure contributors do not face any future liabilities related to plan underfunding. Contributors to plans that are already underfunded may have to pay higher borrowing costs to compensate lenders for plan-related risks they already carry. They may also have to negotiate with a smaller group of lenders and/or offer more collateral, both of which may increase borrowing costs. Our review found numerous examples of lending agreements with conditions related to multiemployer plan underfunding.

Other Observations

Unique funding arrangements can be negotiated with plan administrators. In this case, the interviewee's employer negotiated an appropriate withdrawal liability that allowed them to decouple their employees and retired employees from an increasingly distressed multiemployer plan and move them to a new plan. This action was taken to ensure that their employees and former employees did not suffer the consequences of belonging to a financially deteriorating plan with an increasing number of orphaned participants—participants for whom no employer has an obligation to make contributions. He also mentioned that another plan resisted attempts to spin off his employer's workers, because the plan wanted to avoid preferential treatment of certain plan participants.

Small sponsors are particularly vulnerable to unfunded liabilities in multiemployer plans. Voluntary withdrawal from a multiemployer plan may trigger withdrawal liabilities that can be many times the value of a contributing employer's firm. For this reason, many of the plans are forced to stay and contribute to a plan. Our interviewee suggested more lenient rules on withdrawal liabilities aimed specifically at small-sized sponsors could alleviate this burden.

5. A POTENTIAL THEORETICAL FRAMEWORK FOR CONTAGION

Literature

This section briefly summarizes contagion modeling in finance and economics, but starting from public health. Insofar we are aware, none of the literature directly addresses mass withdrawal issues in multiemployer pension plans, but we find some analogies.

In epidemiology, two types of models exist. Deterministic models were developed as early as 1927. They describe the number of susceptible individuals, the number infected and the number recovered (e.g., Miller 2009). The reproductive ratio R_0 measures the number of secondary infections arising from a single individual during his or her infectious lifetime. $R_0 < 1$ suggests that only a finite number of susceptibles will be become infected and the contagion will die out, whereas $R_0 > 1$ triggers an epidemic. More recently, network-based models have been developed that are stochastic in nature. They capture the uncertainty and variability that is inherent in real-life epidemics (e.g., Imran et al., 2013). Academics have tried to apply these models to finance (e.g., Demiris et al., 2012; Caccioli et al., 2014).

In finance, much of the effort on contagion is on its empirical measurement (Demiris et al., 2012). Existing literature has studied and measured intra-industry effects of contagion. Staum (2012) writes that firms in the same industry can be perceived as less creditworthy because of their similarity to a distressed firm and "contagion can spread among firms that use the same assets as collateral for borrowing, in a phenomenon that combines funding liquidity and asset-market liquidity." Lang et al. (1992) find that the weighted average stock portfolio of competitors fell by 1% in reaction to a bankruptcy announcement while highly-leveraged competitors lost 3.2%. Using a database of credit default swaps (CDS), Jorion et al. (2006) find that CDS spreads for competitors increase after a Chapter 11 bankruptcy, indicating effects of contagion. Conversely, they find that competitors benefit through smaller CDS spreads following a Chapter 7 liquidation.

Hertzel et al. (2008) find that contagion effects can extend along the supply chain to suppliers and customers and eventually to industry competitors. Along similar lines, Helwege and Zhang (2014) argue that the negative externalities of bankruptcy stem from both counterparty exposure and market signals. Counterparty exposure results from direct business ties: The failure of one partner can have direct negative financial consequences for the others. Counterparties may be suppliers that are not paid; a different example is the collapse of Lehman Brothers, which cascaded throughout the financial industry as highly leveraged firms were exposed to the same assets. A bankruptcy may also send a signal about the cash flow of competitors in the same market. The initial failure can lower the value of other firms in the industry. For both counterparty exposure and information contagion, the effects were found to be strongest for financially weak firms. Benmelech et al. (2014) confirmed the role of financial strength in a different setting, namely effects of bankruptcies of large retail chains on neighboring stores.

In short, negative externalities of a bankruptcy may play out (1) through a financial shock to business partners and (2) from signals about financial headwinds in the industry. Turning to multiemployer plans, it appears that the mass withdrawal of one

plan would not generate a financial shock to other plans. However, the argument for information contagion is more applicable. Communication among plan sponsors, administrators, and trustees is likely robust. If one plan experiences a mass withdrawal and its formerly participating employers escape with limited liability payments or other reasonably palatable consequences, news may spread and instigate a cascade of mass withdrawals.

Individual Withdrawals

Before discussing mass withdrawals, consider the factors that an individual employer may evaluate when deciding whether to completely withdraw from a multiemployer plan.

- *Union demands and employee relations.* Companies that consider withdrawing from a multiemployer plan may run into union opposition during the collective bargaining process. Withdrawal from a multiemployer plan generally implies that employees no longer accrue benefits. Also, employees who were not yet vested lose the opportunity to become vested. Employees will likely want to be compensated for their reduced retirement benefits, such as through employer contributions to a (newly established) 401(k) plan. Indeed, for single-employer plans, we found that employers (at least partially) compensated employees for DB plan freezes through expanded DC plan coverage, higher DC plan contributions, and expanded sponsorship of life insurance and long-term disability benefits.¹¹ Such benefits would, of course, involve additional on-going expenses.
- *On-going payments.* While remaining in the plan, the employer needs to make regular contributions to the plan, as negotiated in a collective bargaining agreement. A withdrawal would trigger a withdrawal liability, which is typically payable in installments that are roughly equal to historical contributions. In the short term, the effect on cash flow is therefore likely small (but see below). Depending on the funding status of the plan, the withdrawal liability can be very substantial, but the payment period is capped at 20 years. Employers in the Construction and Entertainment industries are generally exempt from paying withdrawal liability if they no longer perform work in the same geographical area.
- *Potential increase in future contributions.* To avert insolvency of poorly funded plans, employers may face increased contribution rates when their next collective bargaining agreement is negotiated. A withdrawal would avoid such an increase.
- *Potential government bail-out.* Over time, some politicians have attempted to address funding issues with multiemployer plans. For example, in July 2019 the House of Representatives approved a \$48.5 billion package that offers forgivable loans to the most troubled plans.¹² While this particular measure

¹¹ Michael Brien and Constantijn Panis (2013): "Matching Form 5500 Employee Benefit Plan Filings by Employer." Available at <https://www.dol.gov/sites/dolgov/files/EBSA/researchers/analysis/retirement/matching-form-5500-employee-benefit-plan-filings-by-employer.pdf>.

¹² "The Plan to Save Truckers' and Miners' Pensions Is Running Out of Time." *Wall Street Journal*, July 25, 2019.

may not find sufficient support in the Senate, the likelihood that Congress will provide assistance to multiemployer plans is not negligible. By withdrawing from a plan, employers forgo the option of benefitting from such a measure.

In short, the trade-offs that employers face depend on the financial status of the plan, the costs of alternative employee benefits, and the probability and terms of a future bail-out.

To complicate matters, the effect of a plan's financial status may not be monotonic. As a plan's financial condition weakens, the prospect of future contribution increases to keep the plan afloat provides an incentive to withdraw, but at the same time, the withdrawal liability rises and deters any withdrawal.

Mass Withdrawals

The trade-offs for a mass withdrawal are similar to those for an individual withdrawal, with a few differences.

- *No cap on withdrawal payments.* The 20-year cap on withdrawal liability payments generally does not apply to mass withdrawals. Payments may be due into perpetuity if their present value falls short of the withdrawal liability.
- *Potential additional liability.* The withdrawal liability may be higher if so-called reallocation liability rules apply.
- *Nonforfeitable benefits only.* Benefits are automatically reduced to benefits that are nonforfeitable, which may imply a reduced withdrawal liability.
- *Employee relations.* If plan insolvency is likely, benefits may need to be reduced further to the PBGC guaranty (or the level that can be paid with the plan's available resources, if higher). A benefit reduction will likely undermine the employer-employee relationship.
- *Strength through numbers.* Employers' position to negotiate exit settlement terms with plan trustees may be strengthened in a mass withdrawal because of their numerosity.

Contagion of Mass Withdrawals

A potential theoretical framework for modeling contagion of mass withdrawals starts with a model for mass withdrawals. ME-PIMS currently predicts mass withdrawals on the basis of six factors:

1. Plan size (tied to the number of active and total participants),
2. Ratio of active to inactive participants,
3. Ratio of assets to benefit payments and expenses,
4. Ratio of the market value of assets to vested liabilities,
5. Ratio of current year to previous year contributions, and
6. Ratio of credit balance to employer contributions.

The second through sixth factors all relate to a plan's financial status. As discussed above, its effect may not be monotonic, and separate controls for components of financial status may help the model. For example, the ratio of active to inactive participants affects future contribution hikes to keep the plan afloat (if remaining in

the plan) and the cost of sponsoring a 401(k) plan for active employees (if withdrawing). At the same time, it may make sense to combine some factors. For example, the withdrawal liability itself and the required periodic withdrawal payments are potentially more directly relevant than the components that determine such amounts.

Insofar we are aware, the current model of mass withdrawals in ME-PIMS does not account for industry. However, given special withdrawal penalty rules for the Construction and Entertainment sectors, industry may well be a strong predictor.¹³

Up to this point, the discussion applies to individual and mass withdrawals, but not to contagion of mass withdrawals. Many factors that may trigger multiple mass withdrawals are in fact included in the economic factors discussed above. For example:

- *Industry pressure.* Multiemployer plans in the same industry share many relevant factors. An industry may shrink due to off-shoring; unionized firms may be squeezed by the introduction of non-union competition; or an industry may boom due to new export opportunities, low cost of capital, etc. All these factors translate into economic incentives that can be controlled for in a redesigned mass withdrawal model.
- *Potential government bail-outs.* A policy proposal that aims to shore up plans in a certain industry applies equally to multiple plans. While it is difficult to capture in a model the option value of any prospect of industry-wide financial relief, its effect applies to each of multiple plans individually, not as a contagion effect.

What remains is potential contagion due to information effects. A mass withdrawal can send at least two types of information to employers in other multiemployer plans.

First, a mass withdrawal can bring some clarity to the various trade-offs that employers face. While the trade-offs discussed above are generally clear at a conceptual level, it may be difficult to quantify them with reasonable precision. How will workers respond to the loss of benefits? Were negotiated withdrawal liabilities higher or lower than expected, such as perhaps due to a reallocation liability or interpretation of industry exemptions? Additional clarity on these types of issues translates into better decision making; it can trigger additional mass withdrawals, but can also swing the cost-benefit analysis away from mass withdrawals.

Second, unexpected consequences of a mass withdrawal may materially affect the decision-making process. For example, suppose a mass withdrawal is expected to trigger debilitating withdrawal liabilities which would threaten the continued existence of many companies. Firms would be unlikely to proceed with such a mass withdrawal, but suppose it occurs anyway. If a public outcry ensues and results in political measures to support firms that face debilitating withdrawal payments, the

¹³ It is our understanding that a withdrawal without a withdrawal liability is, technically, not a withdrawal. However, for practical purposes, such withdrawals have similar implications for plans as legal withdrawals. It stands to reason for ME-PIMS to define a mass withdrawal based on economic rather than legal criteria.

potential for contagion is realistic. Unexpectedly favorable consequences create a moral hazard—an incentive to take additional risks once losses are covered by insurance. This moral hazard is compounded by the moral hazard that is intrinsic in the bankruptcy system: the downside potential of financial gambles is limited, whereas the upside is not.

In sum, contagion of mass withdrawals can result from the spread of information about unexpectedly favorable consequences of a mass withdrawal. A potential way to incorporate this into ME-PIMS is to generate a stochastic “surprise” shock when ME-PIMS simulates its first mass withdrawal. That stochastic shock should subsequently propagate to multiple plans and affect their probability of experiencing a mass withdrawal. It could transmit just to plans that share a common contributor, or to all plans in an industry, or perhaps even to all plans nationwide, depending on how fast one believes information spreads. Suppose the probability of a mass withdrawal is modeled as a logistic regression; the stochastic shock could serve as an intercept shift. The shock should last multiple years, possibly for the remainder of the simulation horizon. The model would then generate withdrawal probabilities that, *ceteris paribus*, are persistently lower or higher in some scenarios than in others.

6. CONCLUSION

This report characterized historical mass withdrawals from multiemployer plans, assessed the potential for contagion effects from common ties among plans, and developed a theoretical framework for modeling contagion effects in ME-PIMS.

Recent history has seen relatively few mass withdrawals: annually, roughly 0.4% of multiemployer plans experienced a mass withdrawal from 2011 to 2018. Contagion of mass withdrawals to plans that shared a common significant contributor has been largely absent; just 4 out of the 40 plans that experienced a mass withdrawal were connected through a single common contributing employer. There is, however, ample potential for contagion, with many plans in the same industry and many clusters of plans that share common contributors.

We identified factors that may play a role in decisions about individual and mass withdrawals. While such factors may be common to employers that participate in multiple plans in a certain industry, they are applicable to each employer individually. Even if multiple plans were to experience a mass withdrawal due to certain shared circumstances, the withdrawals would be driven by individual decision making rather than causal contagion effects from a particular mass withdrawal. We identified an exception in the form of information, revealed by a particular mass withdrawal, about unexpectedly favorable consequences of a mass withdrawal. Finally, we suggested a parsimonious way to incorporate information contagion into ME-PIMS.

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