


REVIEW ARTICLE

Worker takeovers: a comparative analysis of employee buyouts, other worker-managed firms, and conventional firms in Uruguay

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(Received 30 May 2023; revised 21 February 2024; accepted 23 February 2024)

Abstract

The economic crisis experienced by many developed countries over the past decade saw the emergence of the phenomenon of so-called recovered firms (RFs), or employee buyouts of failed capitalist firms (CFs). While it is obvious that one of the objectives sought by these workers is to keep their jobs, the subsequent performance of these firms is unclear. Are RFs more likely to fail than other worker managed firms (WMFs) or than CFs? Do RF workers get higher incomes than their peers in other WMFs or in CFs? This analysis is based on a linked employer–employee panel data set from Uruguayan social security administrative records. The main findings are that RFs survive longer than other WMFs or than CFs. However, RF workers receive incomes lower than those of their peers at other WMFs or at CFs. This income differential is explained partly by a brain drain process and specific human capital losses.

Keywords: income differentials; labour-managed firms; survival; worker takeovers; worker cooperatives

JEL Classification: D22; J54; P13

During the crises experienced by several developed economies in recent years, as well as the crises experienced in Argentina and Uruguay between 2000 and 2003, the not entirely new phenomenon of so-called recovered firms (RF) emerged. RFs are a type of worker-managed firm (WMF) arising from failed capitalist firms (CF) that are reopened under the control of their workers.

WMFs can be defined as firms that are ultimately controlled by their workers (Dow, 2003). Their members have the same control rights regardless of their capital contributions, meaning that every worker has one and only one vote. This implies that individuals who are not working at the firm cannot be accepted as members (no member can be only a capital supplier). All members must have control rights and claims over the surplus. Hence, the presence of hired workers should be considered a detour from a pure WMF model (Table 1).

This definition specifies pure organizational models. However, in practice, WMFs can hire salaried workers or may associate with other investors. On the other hand, conventional firms may implement different mechanisms of employee involvement. Hence, as pointed out later, one of the challenges of the empirical work is the proper identification of CFs and WMFs.¹

WMFs are formed through two fundamental mechanisms. They can be created *from scratch* by a group of workers (WMF-FS) or from the *conversion* of a conventional firm. The latter form includes RFs.

In 2012, the Uruguayan government created the Development Fund (FONDES in Spanish), a specific financial instrument to promote WMFs. Between 2013 and 2015, FONDES used public resources

¹For a more detailed firm typology see Jones (2018).

Table 1. Worker-managed firms and capitalist firms: main institutional features

Dimensions	Capitalist firm	Worker-managed firm
Membership	Conditional on capital contribution	Conditional on work contribution
Control of decisions	Proportional to capital contribution	One person, one vote
Distribution of surplus	Proportional to capital contribution	Proportional to work contribution
Presence of hired workers	Yes	No

to lend 70 million dollars (more than 0.1% of Uruguayan GDP) to 20 WMFs. Of these 20 firms, 18 were RFs. By 2018, four of these companies had closed, most had problems repaying their debt, and FONDES had lost 65 of the 70 million.

Evidently, the fund suffered from poor project evaluation. The government's concern over job losses could explain the bias of its loans being granted mostly to RFs. But, is the fact of being an RF enough to trigger a warning signal? According to different hypotheses, these firms always inherit part of the characteristics of the failed conventional firm: technology, people, managerial practices, organizational capabilities, routines, social norms, knowledge, reputation, debts, and links with other agents like customers, suppliers, banks, etc. Some of these characteristics are assets the firm wants to preserve and others are liabilities the firm needs to overcome.

I provide a new analysis comparing the performance of RFs with WMFs created from scratch and CFs. Within the economic literature, empirical studies on WMFs are scarce, especially those that perform a comparative analysis of WMF performance according to how they were created. Additionally, the results presented here are useful for the analysis of the wage losses incurred by workers when they lose or change jobs, particularly when it is associated with losses of specific human capital (SHC). Likewise, this study provides relevant information about RFs as a labour policy instrument against unemployment. Last, the results presented here provide useful insights for organizational analysis about how initial conditions of firm formation affect its future performance.

The literature review shows arguments for why RFs might perform better than other WMFs and arguments in the opposite direction. Hence, I will try to clarify this issue by answering three questions: Do RFs tend to survive as long as other WMFs or CFs? However, just the survival of a firm does not mean it performs better. Its workers may have incentives to keep a firm running, under circumstances in which a CF would have already been closed. In this way, being an RF could be a factor that hinders the closing processes of inefficient businesses, necessary for the dynamic efficiency of market economies. However, there is no data that allows an analysis of comparative performance based on the productivity of these firms. Instead, there is information to study the performance of these firms based on the income differentials of their workers. Hence, the second question that will be answered: Are the incomes obtained by RF workers different from those of their peers at other WMFs or at CFs? Finally, if differences are observed by groups of firms, many arguments suggest that they may be due to the initial characteristics of the RFs or those inherited from the CFs that preceded them. These arguments give rise to the third question: What part of these differences in RF workers' income is associated with the preservation of characteristics of the closed CF or other initial characteristics of the RFs?

Literature review

Possibly the main goal of workers who join a RF is to preserve their jobs. However, there is little information on some of the most relevant characteristics of those jobs that are preserved, like stability or incomes. Both elements are clearly associated with the subsequent performance of these firms.

The WMF has attracted the attention of classic economists, such as Karl Marx, John Stuart Mill, Leon Walras, and Alfred Marshall. Since the mid-20th century, an extensive theoretical literature

has been generated trying to explain the small presence of WMFs in market economies. A large part of it has been devoted to the comparative analysis of the performance of WMFs and CFs. Some analyses have focused on the characteristics of these firms, such as their employment and wage determinants (Vanek, 1970; Ward, 1957), their investment decisions (Pejovich, 1992; Vanek, 1977), their collective decision-making (Hansmann, 1996), the possibility that WMFs will degenerate into CFs (Ben-Ner, 1984), or the problem of incentives and the risk of opportunistic behaviour in work-teams (Alchian and Demsetz, 1972). Other explanations have focused on external factors that become barriers for WMFs, such as negative discrimination in the credit market (Bowles and Gintis, 1994).²

Previous research indicates that most WMFs are created from scratch and only a small share are conversions of CFs (these conversions represented 11% of the WMFs in Uruguay (Alves *et al.*, 2012) and 16% in France (Pérotin, 2006)). According to Ben-Ner (1988a), a very small fraction of these conversions involve financially sound CFs.

The model developed by Ben-Ner (1984) serves to explain the emergence of RFs. According to this model, successful WMFs (where members get a higher income than they would as employees in CFs) tend to replace their members with salaried workers. In this way, in the long term they would become a CF. However, if WMFs could exploit some organizational advantage that leads them to have higher productivity than CFs, WMFs could be stable in industries that are not profitable for CFs. The aforementioned also applies to activities that cease to be profitable during recessions. In this way, according to Ben-Ner (1988b), in periods of recessions it would be more likely to observe CFs conversions into RFs.

However, the economic literature on the comparative analysis of RFs, WMF-FSs, and CFs is scarce, having generated more interest in other social sciences. Pérotin (2004) points out different factors that could help RFs survive longer than WMFs created from scratch. First, the RF could inherit a larger scale from the failed CF. Meanwhile, constraints on financing could lead WMF-FSs to have a smaller than optimal size. Secondly, RF members could be more experienced and have more interpersonal knowledge. Third, for WMF-FS could be harder to create links with suppliers, and reputation among customers and financial institutions. Pérotin estimates hazard functions for all French worker cooperatives (SCOPs) created during the period 1977–1993.³ Her work distinguishes WMFs by origin, finding that cooperatives created from scratch have a greater risk of closure compared to RFs.

Nevertheless, some factors could prevent RFs from exploiting these benefits. First, most managerial personnel from the previous CF generally do not participate in the new RF (Hochner *et al.*, 1988; Rebón and Kasparian, 2018), thus damaging its organizational capabilities (Dosi *et al.*, 2008). Moreover, this brain drain will increase as the time elapsed until the RF starts its activities is extended. As long as the younger and more qualified workers have better outside job opportunities, their opportunity cost of waiting can be higher. At the same time, these are the workers who have strategic knowledge related to the management of the firm (Camilletti *et al.*, 2005; Martí, 2006; Martí *et al.*, 2014; Riero, 2009). Additionally, according to Ruggieri and Vieta (2015), the 311 Argentinian RFs they studied experienced an average inactivity lapse of 7 months. These inactivity spans could also generate the loss of customers (Camilletti *et al.*, 2005; Ruggieri and Vieta, 2015). Furthermore, the uncertainty related to the conversion process could negatively affect access to funding from suppliers. In addition, the RF must bear the inherited stigma of being a bankrupted firm (Pires, 2017).

Second, if younger workers are more prone to defect, the median worker's time horizon within the firm could be shorter. Hence, RFs organized under collective property could experience inefficiencies in investment decisions. In these cases, workers might prefer the distribution of surpluses in the form of higher current wages than most forms of investment (Pejovich, 1992; Vanek, 1977).

Third, RFs are in many cases operating in industries with competitive difficulties. Just this fact could be a problem, because businesses fail for a reason. The institutional framework of WMFs can make viable the process of voluntary income cuts for workers at an RF, whereas the same adjustment

²A recent evaluation of the empirical literature on the subject can be found in Pencavel (2013) or Dow (2018).

³A comparative survival analysis of WMFs and CFs in Uruguay can be found in Burdín (2014).

would not be feasible in the institutional framework of a CF, due to its inability to establish a credible agreement between employer and employees (Bowles, 2004). An adjustment of this type could increase the chances of survival for the RF if the workers have an important accumulation of SHC and WMFs could exploit some organizational advantage that would lead them to have higher productivity, even in an industry in which a CF would choose to close.⁴ According to Amarante *et al.* (2014), workers who switched industries after their job loss, with higher SHC losses, experience an average wage loss of 40% a year after separation and 12% after five years. This fact makes employee involvement in firm buyouts more likely with high worker investment in firm-SHC (Chaplinsky *et al.*, 1998).

Ben-Ner and Jun (1996) provide a model explaining the rationale for a conversion from a CF to an RF. According to these authors, in cases of collective bargaining between unions and firms, the possibility of conversion to an RF can work as a screening mechanism when the firm's profitability is private information held by the CF's managers. If the future prospects of the firm are good, managers will accept a wage agreement beneficial to the workers (even in an unfavourable current situation for the firm), but they will not accept the buyout of the firm by the workers. However, the inverse is also true. If future prospects are bad, managers would prefer to sell the firm to its workers before accepting their wage demands. Hence, workers would only end up owning firms with poor prospects. Unless workers are able to generate improvements in productivity compared to the previous CF, the new RF will be more likely to fail.

However, WMFs could exploit some comparative advantages compared to CFs in relation to worker motivation, use of worker knowledge, and lower monitoring costs. This could be the case for both peer monitoring among members (Dow and Putterman, 2000) or easier monitoring of managers (Hueth and Marcoul, 2015). This is one reason that WMFs could be viable in industries with low profitability for CFs.

Nevertheless, the conditions of the Recovered Firm creation could be critical to its subsequent performance. The possible existence of an organizational inertia from the previous CF with its old, more hierarchical management practices, could prevent the emergence of the participatory structures required to exploit the mentioned advantages (Hannan and Freeman, 1984). Another source of rigidities could be originate in imprinting processes where some organizational building blocks, like jobs or routines, continue to reflect the circumstances of their creation (Marquis and Tilcsik, 2013). Additional difficulties to introduce organizational change could arise from path dependence trajectories due to past technological choices. Specially, if firm's inheritance includes specific or hard to replace physical assets (David, 1985; Sydow *et al.*, 2009).

The reviewed literature highlights how critical could be the way the RF is created and what happen during the inactivity lapse since the previous CF cease its activity. If the firm manage to get rid of the inherited ballast and, at the same time, keeps the most valuable assets of the closed firm. The following sections will explain how I try to analyse if there are performance differences between RFs, other WMFs and CFs and how these differences are affected by the firm's inheritance.

Data and context

This article studies whether the way a WMF is created affects the subsequent survival and performance of the firm. Additionally, I study whether the conservation by the RF of some characteristics of the closed CF improves its performance or chances of survival.

I use a linked employee-employer monthly dataset from the records of Uruguayan social security.⁵ These records include, first, a panel of all workers at Uruguayan cooperatives. It includes more than 1.2 million observations corresponding to 30,743 workers and 526 producer cooperatives (PCs). The data reports workers' information: earnings (including dividends for WMF members), sex, age,

⁴Analysing the cases of Meriden, Kirkby and the Scottish Daily News conversions in the UK in the 1970s, Bradley and Gelb (1980) also highlight that conversion processes from a failed conventional firm to a worker cooperative are more likely to select the workers with higher accumulation of specific human capital and worse outside options.

⁵The Uruguayan social security agency is the Banco de Previsión Social (BPS).

tenure, and link with the firm (if the worker is an owner or an employee). It also includes information on the firm at which workers have their jobs, such as the employment level, legal form (if CF or PC), and industry (five-digit ISIC, Rev. 4). The data cover the period April 1996–December 2013. For workers at CFs, I use a sample of 10% of the workers (more than 20 million observations of 200,000 workers). The sample includes workers of all industries and all legal forms. Finally, the data also include information on a sample of 20% of the CFs (more than 205,000 firms), including the data of all of their workers. The inclusion of this third database is because the sample of workers, although it contains information on the firms they work for, is not representative of firms because it is biased towards larger businesses. I restrict the sample, excluding public and rural workers.

The evolution of the Uruguayan economy during the 1996–2013 period had three different phases. From 1996 to 1998, the economy grew. In 1999, it entered a recessive phase, with a deep crisis in 2002. During that year, the unemployment rate reached 17%. However, the economy recovered after 2003. At the beginning of the period, collective bargaining was unusual, but in 2005 the government decreed mandatory industry-level collective bargaining. This policy, jointly with the fall of the unemployment rate (6.7% in 2013), improved the bargaining power of workers at CFs.

The Uruguayan legal framework identifies producer cooperatives. However, it is a common practice among cooperatives to hire employees. To distinguish among these cases, Uruguayan law defines WMFs as PCs in which the employees do not represent more than 20% of all members. WMFs are allowed to surpass this threshold because of changes in seasonal demand; however, to obtain a payroll tax exemption, they must adhere to the legal limit.⁶ According Uruguayan law, payroll tax is 22.5% for hired employees in CFs or WMFs and 15% for members of WMFs. Using this delimitation, approximately 50% of PCs are defined as WMFs. Econometric estimates will be performed for these WMFs only.

Some organizational characteristics of Uruguayan WMFs are established by law, but a broad range of rules are defined by the firms themselves. All WMFs have a general assembly that selects the managers as well as a board that supervises the firm. Regardless of a member's capital contribution, every member has one vote. Members can own the assets of the firm either individually or collectively. In the first case, members have tradeable shares, while in the second case, members can usufruct as long as they work at the firm. Collective ownership is the most frequent option among Uruguayan WMFs: according to Alves *et al.* (2012), less than 10% of WMFs in Uruguay are owned by their members through individual shares. Uruguayan law does not include other constraints on WMFs related to the hiring of salaried workers, except for those that apply to CFs. Employees of WMFs have the same rights hired workers have in CFs. The firm can pay different wages to members and employees, and the latter do not enjoy returns on capital.

The data do not identify RFs. However, based on the information available, it is possible to know which WMFs are RFs using a series of criteria. Worker records include information not only about their membership in WMFs, but also their previous and subsequent jobs. This fact allows us to have information about the previous firms at which the worker was employed. Using this information, a WMF that meets the following criteria will be considered a recovered firm:

- 1- More than 50% of the founding members of the WMF worked previously at the same CF.
- 2- The CF where they worked previously reduced its workforce by at least 90% either before or in the first year of the WMF.⁷
- 3- The CF where employees worked previously and the new WMF both operate in the same industry.

⁶This operative delimitation is the same used in other works on Uruguayan WMFs (Alves *et al.*, 2016; Burdín, 2014, 2016; Burdín and Dean, 2009, 2012; Dean, 2019).

⁷Originally, the second identification criterion for RFs was stricter: to be an RF, the previously-existing CF must have closed before the WMF was created. However, the data include several cases in which the periods during which the CF still worked and the RF had begun its activities overlapped. This problem made it necessary for me to make case by case observations in the database, ultimately choosing to consider this other criterion.

The closure of a CF is identified by the fact that there are no more records of the firm. Despite this, it is not possible to be sure that it is a failed firm. Hypothetically, it could be a profitable CF that was acquired by its workers, and its absence in the social security records is due to the change of legal form of the firm. Therefore, this is a potential source of measurement error. However, among the consulted members of the National Association of Recovered Firms (ANERT) and the Uruguayan Federation of Production Cooperatives (FCPU), there are no known cases of this type for Uruguay. Therefore, it is reasonable to assume that all observed conversions are cases of failed CFs. The creation and subsequent performance of RFs and other WMFs was not influenced by the creation of FONDES in 2012 (mentioned above) because its first loans were granted at the end of 2013, which is also the end of the period under analysis.

Descriptive results

In this section, I present descriptive information about the different firms. Insofar as it is not possible to identify RFs created before 1996, descriptive statistics present separately information on new firms and old ones (those created after or before 1996, respectively). As Table 2 shows, compared to other new firms, RFs are usually larger than the WMF-FSs and CFs, which are of similar size. That might happen because RFs have inherited part of the previous CF's scale. On the other hand, workers at CFs and WMF-FSs show greater female participation than those at RFs.⁸ Additionally, workers at RFs usually get similar earnings to those of other new firms (WMF-FSs or CFs). Regarding worker age, no clear difference is appreciated between RFs and WMF-FSs (except at the end of the period), but when compared with employees of CFs, the latter are always younger. Likewise, the workers at old WMFs have in general a higher average tenure than those at old CFs, while there is no clear trend among new firms. Finally, compared to new firms of the same type, old firms tend to have older workers, with higher tenure and earnings.

To complement the previous information, data on the initial characteristics of firms created after 1996 are presented. In the case of RFs, the characteristics of the new firms are shown, as well as information on the failed CFs. As shown in Table 3, the initial size of the RFs is bigger than that of other firms, possibly because they inherited part of the scale of the previous CFs. This result is observed even though only an average of 35.3% of the former workers at the failed CF join the new RF, indicating that RFs have some difficulty in preserving the full scale of the previous firm. This problem is worse among the workers in the last quintile of wages at the pre-existing CF. In that case, only 25.9% of workers are among the RF's founding members. These figures could be a sign of a brain drain problem, as pointed out by Rebón and Kasparian (2018).⁹ Additionally, the brain drain problem could be worsened by the long periods of inactivity (the lapse between the closure of the previous CF and the beginning of the new RF's activities), which averaged 14.4 months. On the other hand, it should be noted that the average age of RF founding members is 42 years old, which is 3 years older than for WMF-FSs and 7 years older than for the CFs' initial workforce. This result could impact the firms' willingness to take risks and invest. Finally, average tenure in previous jobs or in the industry is higher among the founding members of RFs. These strong differences, in addition to the average age, could be an indication that these workers have a higher accumulation of firm or industry-SHC and very limited outside options (Camilletti *et al.*, 2005; Martí, 2006; Martí *et al.*, 2014; Riero, 2009).

Figure 1 shows the industry composition of firms. For CFs it experienced less dramatic changes than those of WMFs, but highlights include the loss of participation of Manufacturing and the weight gained by Low-skilled Services. On the other hand, among WMFs, the industry composition changed dramatically. While 60% of the old WMFs operate in Transport, among new WMFs such industry

⁸The high female participation rate observed among RFs in 1997 is due to the industry composition of the few cases at the beginning of the period (two of the three firms were textiles).

⁹Another possible explanation for the low percentage of workers from the fifth quintile of wages who join the RF could be that WMFs require fewer personnel to perform monitoring tasks or that the former CF had an excessive managerial staff.

Table 2. Descriptive statistics: linked employer–employee panel data

	1997					2005					2013				
	New RF	New WMF-FS	Old WMF	New CF	Old CF	New RF	New WMF-FS	Old WMF	New CF	Old CF	New RF	New WMF-FS	Old WMF	New CF	Old CF
<i>Firm-level information</i>															
Number of firms	3	10	140	4,033	12,328	10	73	95	10,329	5,695	17	117	61	18,943	4,268
Average size (number of workers)	7.0	8.3	27.3	8.0	18.8	35.3	15.7	33.0	11.3	28.4	58.5	18.8	48.5	14.6	45.11
Average share of female workers	61.1%	33.0%	22.6%	39.6%	38.2%	30.9%	45.3%	20.9%	40.5%	37.7%	32.0%	51.5%	29.1%	43.3%	38.9%
Average monthly earnings	9.6	7.5	16.8	10.6	13.8	7.0	8.4	13.5	9.5	12.7	16.6	15.6	20.4	16.1	21.9
Average standard deviation of earnings (SD)	3.7	0.7	3.1	4.6	6.2	1.6	2.7	3.3	3.7	5.5	4.5	5.8	6.5	7.0	10.1
Average age	37.2	37.6	43.8	34.0	36.5	41.9	42.2	47.4	36.9	39.5	44.1	42.6	49.3	37.4	40.2
Average standard deviation of age (SD)	10.1	8.8	9.6	9.7	10.5	9.2	9.7	9.3	9.7	10.5	10.2	10.1	9.0	10.4	11.3
Average job tenure	0.9	0.8	4.8	1.4	4.9	1.6	2.5	8.3	2.5	7.5	4.2	3.3	11.4	2.9	7.4
Average standard deviation of tenure (SD)	0.2	0.2	2.3	1.3	3.7	0.5	0.9	5.1	1.8	5.5	1.1	1.4	7.2	2.3	6.6
<i>Worker-level information</i>															
Number of firms	21	83	3,827	3,441	22,971	353	1,145	3,143	9,363	15,472	995	2,197	2,957	19,236	19,525
Average share of female workers	61.9%	43.4%	11.8%	46.3%	48.8%	29.7%	46.0%	12.3%	46.8%	54.0%	25.6%	46.8%	14.1%	47.5%	58.8%
Average monthly earnings	6.4	6.8	37.4	13.3	25.9	8.2	9.3	33.7	11.2	22.5	24.9	17.6	45.4	21.1	35.4
Standard deviation of earnings (SD)	6.6	4.0	20.5	12.5	20.6	5.0	7.6	17.1	10.9	15.8	10.0	13.4	19.9	18.1	23.8
Average age	38.2	39.5	42.0	32.4	37.9	42.8	41.0	45.1	35.8	40.9	44.5	39.6	45.0	39.3	40.8
Standard deviation of age (SD)	9.8	10.9	10.8	11.2	11.7	11.4	12.5	10.4	11.5	11.5	10.0	12.8	10.7	13.0	11.5
Average job tenure	1.1	0.7	7.3	0.6	7.7	1.2	2.1	11.4	2.2	10.6	2.4	2.2	11.5	2.9	9.7
Standard deviation of tenure (SD)	0.5	0.4	7.4	0.5	7.9	1.5	2.2	8.1	2.5	9.0	3.4	2.8	9.1	3.3	9.8

Source: Author's calculations using social security records.

Note: Summary statistics are reported in October of each year. Tenure is measured in years. Wages are measured in thousands of pesos uruguayos deflated by CPI.

Table 3. Initial characteristics of RF, WMF-FS and CF. Firm-level information

	RF	WMF-FS	CF
Inactivity lapse (months)	14.4 (22.9)		
Share of former coworkers	0.35 (0.28)		
Share of former coworkers of the 5th quintile	0.26 (0.23)		
Final failed CF size	141 (185)		
Initial size	37 (61)	17 (31)	6.3 (12.6)
Initial average age	42 (5.8)	39 (7.1)	35 (10)
Average initial industry tenure	6.7 (6.2)	1.7 (2.3)	1.8 (3.6)
Average tenure in previous job	6.3 (5.9)	1.6 (2.3)	1.6 (3.4)

Source: Author's calculations using social security records.

Note: Summary statistics are reported for the first year of each firm. Standard errors reported in parentheses. Tenure is measured in years. For WMFs (both RFs and WMF-FSs), figures reported are for founding members (excluding hired employees). For CFs, age and tenure reported are for hired employees.

share is less than 10%. At the same time, the industry composition of new RFs and new WMF-FSs is radically different as well. Among the first group, Manufacturing has a share of 75%, while among WMF-FSs, the share is less than 15%. This result is probably explained by the fact that many RFs arise in industries that produce tradable goods and face strong competition from imported goods (Vieta *et al.*, 2016). Among WMF-FSs, there is an important share of High-skilled Services (including Health and Education), representing 40% of new WMF-FSs.

Survival

To address the initial question posed at the end of the introduction – do RFs tend to survive as long as other WMFs or CFs? – I estimate Kaplan and Meier (1958) survival functions; the variable of interest is the time elapsed between the time the firm was created (entry) and when it closed (exit). Firms' spells in the database can be complete or right-censored. The latter occurs when the entry date is known, but its exit has not yet occurred at the end of the period.

The results, shown in Figure 2, indicate that RFs have on average a higher survival than both CFs and other WMFs. In turn, WMF-FSs have a survival slightly higher than CFs.¹⁰ Figure 2a shows the survival functions for all CFs and production cooperatives regardless of size. At the same time, I use an undemanding criterion for RFs, since all PCs are classified in this way if at least 10% of the founding members had belonged to the converted CF. In Figure 2b, micro-enterprises are excluded (firms whose initial size was less than five workers). Figure 2c also excludes all PCs with an initial share of employees larger than 20%, hence using only CFs and WMFs for estimation. Finally, in Figure 2d, all WMFs in which less than 50% of the founding members were not coworkers in the

¹⁰The comparative survival analysis of WMFs and CFs in Uruguay by Burdín (2014) arrives at a similar result.

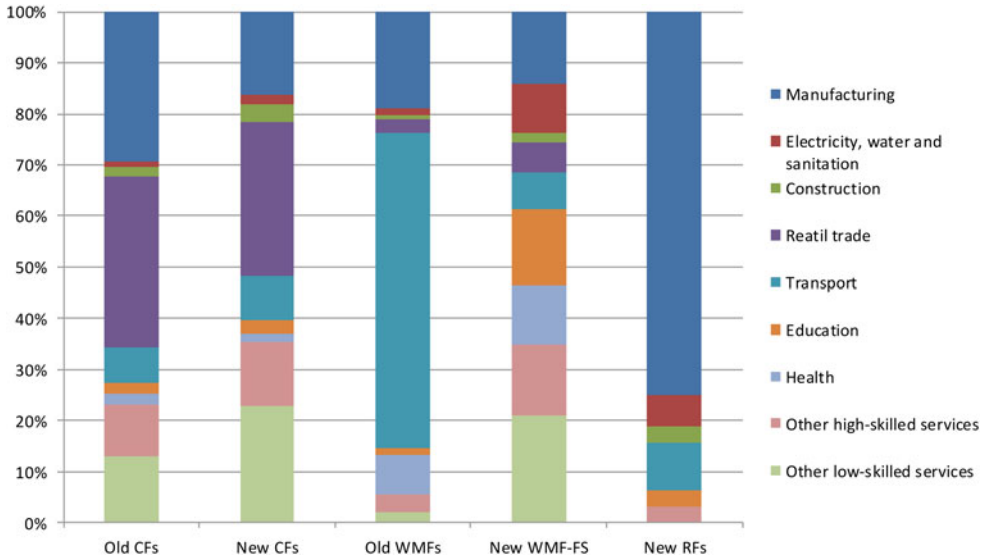


Figure 1. Industry composition of firms by group and creation date. Source: Author’s calculation using social security records.

previous CF are not considered RFs. In each group of estimated functions, incrementally restrictive criteria were used, reducing the number of firms used in the estimates.¹¹

One of the problems with these estimates is that the number of RFs is low and, once I use more restrictive criteria, the number of cases decreases even more. However, according to the log-rank test, I reject the null hypothesis of equality of the survival functions, even using the most restrictive criterion, which is the case shown in Figure 2d ($\chi_{(2)} = 94.47$). For example, ten years after the firms were created (120 months in Figure 2d), approximately 10% of CFs, 37% of WMF-FSs, and 60% of RFs survive.¹²

The different results observed among CFs, WMF-FSs and RFs could be due to a composition effect. For example, if a greater proportion of CFs were created during the 2002 crisis, a higher number of business closures for CFs may be expected. To solve this problem, I would ideally estimate separated survival functions by industry and cohort. However, given the low number of RFs in the database, this is not possible. However, I can compare RFs and WMF-FSs with 50 samples of 2000 CFs that have the same industry and cohort composition as the WMFs created after 1996. As seen in Figure 3, the survival of these CF samples is slightly higher than the whole group of CFs, but still lower than the WMF-FSs and RFs.

Earnings differentials

To analyse the second question posed at the end of the introduction -are the incomes obtained by RF workers different from those of their peers at other WMFs or at CFs?- I estimate the earnings differences between RFs, WMF-FSs, and CFs, using the following equation:

$$w_{it} = \alpha_0 + \alpha_1 C_{it} + \alpha_2 R_{it} + \beta X_{it} + \gamma Y_{it} + \delta Z_t + \mu_i + u_{it} \tag{1}$$

¹¹For Figure 2a, 100,247 CFs, 389 PCs created from scratch, and 50 RFs were used. In Graphs 2b, 2c, and 2d, the number of cases used were, respectively, 39,620 CFs, 329 CPs created from scratch, and 47 RFs; 39,620 CFs, 238 WMF-FSs, and 36 RFs; 39,620 CFs, 249 WMF-FSs, and 25 RFs.

¹²Pérotin (2004) also finds a greater survival of French RFs compared to other WMFs.

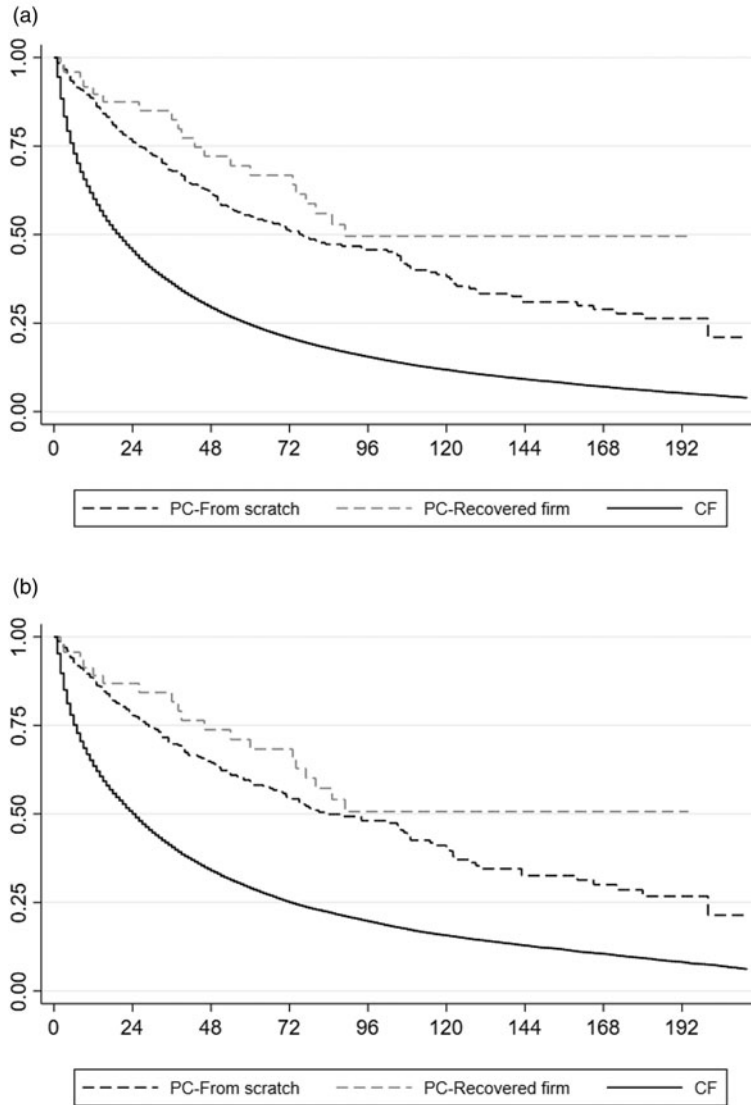


Figure 2. Kaplan–Meier survival functions by group of firms. (a) PC and CF using loose definition for RFs K–M survival estimates. (b) PC and CF excluding Micro-enterprises using loose definition for RFs K–M survival estimates. (c) WMF and CF excluding Micro-enterprises using loose definition for RFs K–M survival estimates. (d) WMF and CF excluding Micro-enterprises using strict definition for RFs K–M survival estimates.

Notes: The Kaplan–Meier survival function is defined as $\hat{S}(t_j) = \prod_{t_j > t} (1 - d_j/n_j)$, where d_j is the number of failures at t_j , and n_j is the number at risk at t_j (before the occurrence of the failures).

where w_{it} is the logarithm of worker i 's earnings in month t . The coefficients of interest are α_1 and α_2 . C_{it} is a dummy variable that takes a value of 1 if worker i is employed in a WMF in t and 0 otherwise. R_{it} is a dummy variable that takes a value of 1 if worker i is employed in an RF in t and 0 otherwise; X is a vector of worker control variables that includes age, job tenure and sex in t ; Y is a vector of firm control variables that includes industry (two-digit ISIC code) and size (number of employees); Z_t is a vector of monthly and yearly dummy variables that capture the effects of the macroeconomic cycle and seasonality; μ_i represents unobservable factors that affect a worker's earnings, which vary across workers but are constant over time; and u_{it} represents unobservable factors that vary across workers and over time.

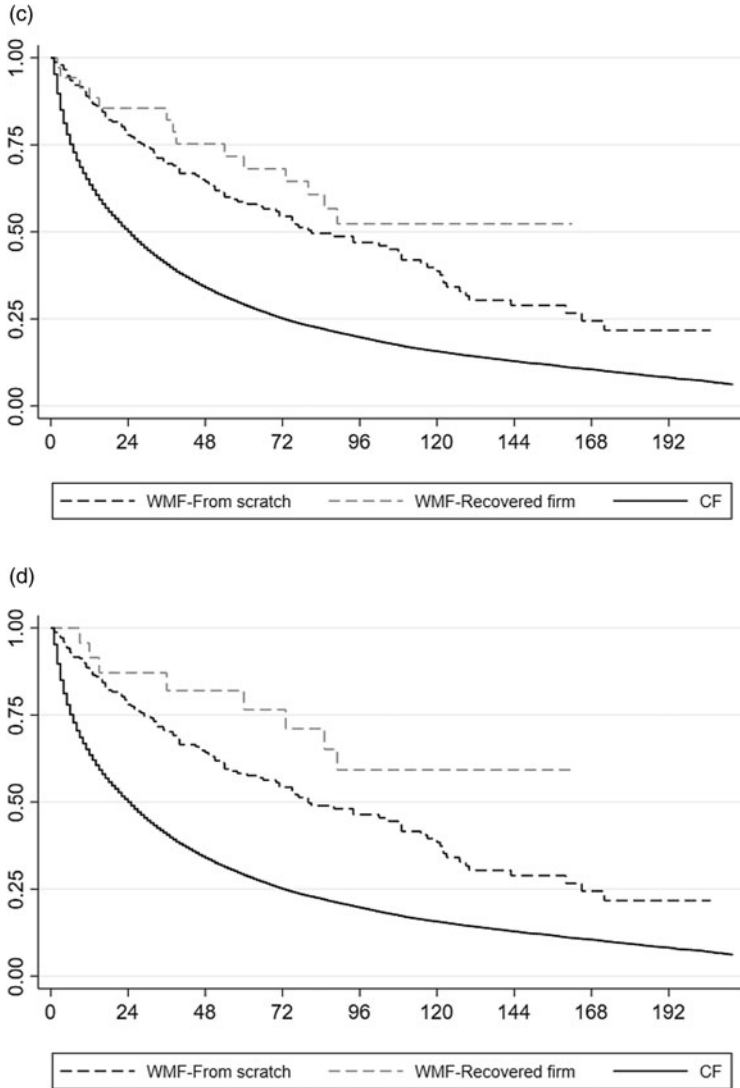


Figure 2. Continued.

To identify earnings differentials by firm, I exploit the fact that workers switch jobs and that the data I use include previous and subsequent jobs.¹³ It is known that fixed effects estimates of a relatively persistent status – as happens when number of switchers is small – are more susceptible to attenuation bias due to possible measurement errors (Card, 1996; Freeman, 1984). However, in this research, measurement errors are of less concern because the estimates use administrative records that are unlikely to reflect either systematic miscoding or misreporting.

Table 4 shows the results for the estimates of equation (1). The estimated coefficient α_1 is positive and significant, and it shows that workers at WMFs earn 2% more than those employed at CFs (column 2).¹⁴ However, the estimated coefficient α_2 indicates that workers at RFs suffer an earnings

¹³The share of workers in the dataset who switch between WMFs and CFs is roughly 23.8% (31,908 switch 38,234 times from a CF to a WMF, and 34,915 times from a WMF to a CF).

¹⁴Burdín (2016) arrives at very similar results using similar data for Uruguay.

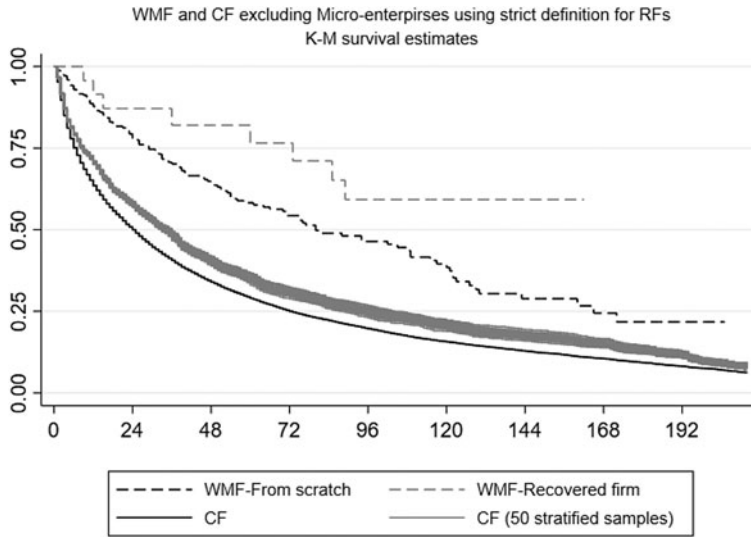


Figure 3. Kaplan–Meier survival functions by group of firms.
Notes: Kaplan–Meier survival functions for 50 stratified samples of CFs, each one representing a sample of 2000 conventional firms that have the same industry and cohort composition as the new WMFs.

penalty of 24% compared to workers at other WMFs. Obviously, this result also indicates that such workers would have earnings lower than those at CFs. Based on this initial analysis, it appears that the specifics of RFs may cause them to perform worse than other WMFs and worse than CFs.

In order to evaluate the robustness of the results, I estimate equation (1) with some variants. First, in column 3, I include all the PCs, regardless of the employees to member ratio of the firm. Adding more than 8,000 workers, most of them hired employees. Columns 4–12 of Table 4 show the results when, instead of considering the current ratio of employees to members (used in column 2 of Table 4), I exclude those PCs with a ratio higher than 20% in the firm’s first year. Next, I use a loose definition for RFs, requiring 10% of founding members to be employees in the previous CF instead of 50% (column 5). In column 6 I exclude the salaried workers of WMFs, considering only the employees of CFs and the members of WMFs. Considering that the available data do not include information on education, columns 7–12 show the results using only workers older than 25. After 25, it is unusual to observe changes in levels of formal education. Additionally, I excluded micro-enterprises (with fewer than 6 workers) because Uruguayan law forbids WMFs from having fewer than 6 members, eliminating the possibility of micro WMFs (column 8). In all cases, the earnings differential of RFs remains negative and in a range of 15–22%. Hence, compared to the whole population of WMFs and a representative sample of all CFs, RFs perform worse than these firms, at least if the firm’s performance is measured through its workers’ earnings. But maybe this comparison is unfair.

Column 9 presents the results when equation (1) is estimated only for workers who were employed at CFs that later became RFs. This group includes both the workers who became part of the RF and those who chose to work at another conventional firm. Compared to those who remain working at another CF, RF workers experience a negative earnings differential close to 8.5%. Obviously, this result does not indicate that if all workers at the previous CF had joined the RF, they would experience this earnings differential. Neither does it mean that if RF workers had chosen to work at another CF, they would avoid their negative earnings differential at all. It is very likely that those who later joined a CF are those who had better prospects at this type of firm. In order to be able to make a counterfactual analysis of the earnings differentials of RF workers, another methodological design and different data would be needed. However, a better approximation to the problem can be made by estimating

Table 4. Earnings gap between workers at RFs, WMF-FSs and CFs

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
WMF	-0.013 (0.009)	0.017 (0.009)*		0.014 (0.007)*	0.015 (0.007)*	0.044 (0.011)***	0.000 (0.008)	-0.004 (0.009)			-0.042 (0.015)***	
PC			-0.017 (0.005)***									
RF	-0.032 (0.021)	-0.241 (0.020)***	-0.153 (0.015)***	-0.214 (0.018)***	-0.178 (0.018)***	-0.224 (0.022)***	-0.207 (0.020)***	-0.213 (0.020)***	-0.093 (0.028)***	-0.06 (0.047)	-0.090 (0.029)***	-0.019 (0.090)
R ²	0.426	0.230	0.236	0.228	0.228	0.220	0.211	0.182	0.131	0.193	0.204	0.200
Number of workers	117,764	117,764	126,206	117,764	117,764	102,174	98,415	93,287	16,539	48,001	56,477	29,377

Notes: The dependent variable is the logarithm of monthly earnings. In column (1), Pooled OLS estimates for WMFs and CFs are shown; columns (2) – (12) show the results of the panel data fixed effects estimates. The estimates corresponding to column (3) includes all PCs. In columns (4) – (12), only PCs with an initial employee/member ratio lower than 20% are considered as WMFs. The estimates corresponding to column (5) use a loose definition for RF, requiring 10% of founding members to be employees in the previous CF instead of 50%. In column (6) salaried workers for WMFs are excluded. In columns (7) – (12), those younger than 25 are excluded. In column (8), microenterprises are excluded. In column (9), only workers who were employed at a CF predecessor to an RF are considered. In column (10), only workers who were employed at a failed CF are considered. In column (11), only firms created after 1996 are considered. In column (12), only those who have a job at firms created after 1996 after having been employed in a failed CF are considered. In addition to the variables shown here, all estimates include sex, age, tenure, size and industry and yearly dummies as control variables. Robust standard errors (reported in parentheses) allow intragroup serial correlation. *Significant at 10%; **significant at 5%; ***significant at 1%.

equation (1) for all workers who were employed at a closed CF (column 10). In this case, the earnings differential observed in RFs is small (possibly null), since the coefficient is 6% but not significant. So, RFs don't perform as badly in this comparison.

Another fact that should be considered is that the identification strategy only allows me to identify RFs created after 1996. Hence, the observed earnings differential for RFs may be capturing a cohort effect. To solve this problem, I estimate equation (1) only for firms created after 1996 (column 11). In this case the negative earnings differential drops to 13%. Finally, I estimate equation (1) only for workers who were employed in failed CFs and consider only firms created after 1996 (column 12). This may be a fairer comparison for RFs. Compared to this group of workers, the earnings differential for RFs is very low or zero. Again, in this comparison, RFs perform just as well as CFs. For these workers, there are probably not good options if they want to maintain the earnings they had in their previous job. It doesn't matter if they move to a CF or join the RF, they will experience similar earnings losses either way.

Additionally, in order to analyse the impact of some characteristics of RFs on their earnings differentials and try to answer the third question mentioned at the end of the introduction, I added six variables to equation (1): First, the time elapsed between the closing of the pre-existing CF and the entry of the RF. Second, the size of the previous CF (a proxy of its scale). Third, the percentage of workers at the previous CF that joined the RF (a proxy of how much of the previous CF's scale is preserved). Fourth, the percentage of previous CF workers in the last quintile of wages who joined the RF at its startup (a proxy of how much of the high-skilled labour of the previous CF is preserved). Fifth, the average age of the RF founding members. The five variables just mentioned take a value of 0 when the firm is not an RF. Finally, I added workers tenure at the firm and in the industry of their previous job at the time they quit or lost their jobs. This variable is meant to capture the accumulation of SHC that the workers had when the CF closed. This variable is interacted with a dummy variable that identifies RFs. For the estimates included in Table 5, the PCs that have an initial ratio of employees to members higher than 0.2 were excluded, as well as workers under 25 years old (the same set of data used for the estimates shown in column 7 of Table 4).

The results with the added variables can be seen in Table 5. The inactivity lapse negatively affects the earnings of RF workers (column 1) as was suggested by Ruggieri and Vieta (2015). Each year of additional inactivity is associated with an extra income penalty of 4.8%. This impact may be associated with several of the factors mentioned in Section 1: the defection of the most qualified workers, the loss of customers and others. However, this variable alone cannot explain the entire earnings penalty of RF workers. In the hypothesis with no inactivity lapse, the estimates indicate that the workers will still experience an earnings penalty of 16%.

Column 2 results indicate that the inherited scale is an important factor in explaining the future performance of RFs (Pérotin, 2004). For every 100 additional workers that the previous CF had, the estimated earnings penalty is 5.7% lower. However, in order for RF workers to experience no earnings penalty at all, according to these results, the failed CF should have a size of at least 747 workers.¹⁵ This size was not reached in any of the observed RFs (the highest observed value was 662 workers).

Column 3 of Table 5 includes the initial age of the RF founding members. According to the results, a reduction of 1 year in the average age of the founding members is associated with a decrease in the earnings penalty of 2.5%. The average age of the founders of an RF is 42 years old, compared with 39 years old for other WMFs (Table 3). Hence, if that difference were reduced to 0, the estimated earnings penalty would be 25.5% instead of 33.0%.¹⁶ This result could be explained by various factors, such as Pejovich's (1992) underinvestment hypothesis. In column 3 it can be seen that the coefficient associated with the firm's inactivity lapse is no longer significant. The same occurs for the estimates

¹⁵In order to achieve this result, as well as those in the following paragraphs in this section, the other variables that characterize RFs are evaluated at the mean.

¹⁶The effect of the initial age could be due to a cohort effect of the workers if they had, on average, different educational levels. However, an education variable is not available to rule out this possibility.

Table 5. Factors affecting the earnings differentials of RFs workers

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
WMF	0.001 (0.008)	0.001 (0.008)	0.002 (0.008)	0.001 (0.008)	0.001 (0.008)	-0.042 (0.015)***	-0.045 (0.014)***
RF	-0.159 (0.027)***	-0.383 (0.054)***	0.658 (0.146)***	0.604 (0.138)***	0.436 (0.144)***	-0.028 (0.033)	-0.045 (0.034)
Inactivity lapse	-0.004 (0.002)**	-0.003 (0.002)*	-0.001 (0.002)	0.002 (0.002)	0.003 (0.002)		
Failed CF final size (100s of workers)		0.057 (0.010)***	0.054 (0.010)***	0.068 (0.009)***	0.086 (0.010)***		
Initial average age			-0.025 (0.003)***	-0.028 (0.003)***	-0.026 (0.003)***		
Share of former coworkers				0.344 (0.056)***			
Share of former coworkers of the 5th quintile					0.659 (0.082)***		
SHC						-0.003 (0.001)*	-0.011 (0.001)***
SHC × RF						-0.024 (0.007)***	-0.017 (0.002)***
Observations	6,090,288	6,090,288	6,090,288	6,090,288	6,090,288	1,977,572	1,977,547
R ²	0.211	0.211	0.211	0.211	0.211	0.205	0.205
Number of workers	98,415	98,415	98,415	98,415	98,415	56,472	56,473

Notes: The dependent variable is the logarithm of monthly earnings. Columns (1)–(7) show the results of the panel data fixed effects estimates. Columns (6) and (7) exclude employment periods starting before April 1996. In addition to the variables shown here, all estimates included sex, age, tenure, size and industry and yearly dummies as control variables. Robust standard errors (reported in parentheses) allow intragroup serial correlation. *Significant at 10%; **significant at 5%; ***significant at 1%.

presented in columns 4 and 5. This result is reasonable if the impact of the RF inactivity lapse is associated with the defection of younger and more skilled workers. This effect is now partially captured by the age of the initial members and the percentage of CF workers who join the RF.

Another variable that seems to have a great impact on the performance of RFs is the percentage of workers who participate in the creation of the RF. For each additional 10% of previous coworkers who join the new firm, the expected earnings penalty is 3.4% lower (column 4). However, even in the best scenario, in which 100% of CF coworkers participate in the new RF, the earnings penalty is still 13%.

However, these results change when high-skilled workers are considered separately. The percentage of workers in the last quintile of wages who join an RF is critical to its performance (column 5) as suggested by several authors (Hochner *et al.*, 1988; Martí *et al.*, 2014; Rebón and Kasparian, 2018). The results indicate that for every additional 10% of high-skilled workers who join the new firm, the expected earnings penalty is 6.6% lower. In this case, it suffices to have 79% of the most skilled workers from the CF integrate into the RF to get an earnings penalty of 0.

Finally, I consider the impact of industry or firm-SHC accumulation in previous jobs. This variable can only be estimated for those jobs that, having started after April 1996, allow me to observe the previous employment period for the same worker. Column 6 shows that firm-SHC accumulation is less relevant in explaining the earnings of CF and WMF-FS workers. However, for RF workers each additional year of firm tenure at the time the CF closed is associated with an earnings penalty of 2.7%. Moreover, when this variable is included, it captures the whole earnings differential effect of RFs. This result is striking, since one reason that workers may have to choose to create an RF is to be able to continue using their SHC (Chaplinsky *et al.*, 1998). According to this result, for RF workers, it may be difficult to use their SHC (or at least to make full use of it). When industry-SHC is considered (column 7), an earnings penalty of 1.1% for every year of tenure in the industry is also observed for other workers, although it is lower than the 2.8% observed for RF workers.

Final remarks

To analyse the comparative performance of RFs, WMF-FSs, and CFs, I use a linked employee-employer data-panel from Uruguayan social security records. First, I tried to answer if the RFs tend to survive as long as other WMFs or CFs. The results indicate that RFs survive longer, even when the different industry and cohort composition of each group of firms is considered. Second, I asked myself if the incomes obtained by RF workers were different from those of their peers at other WMFs or CFs. In spite of RF's longer survival, their workers receive a substantially lower income (approximately 21% lower). However, when compared with a more similar group of workers – workers that were employed in firms created after 1996 after having been employed in failed CF – no relevant differences are found. In this case, the earnings differentials were close to zero. The available data and methods do not allow me to disentangle which of the different reviewed hypotheses are behind the observed results. Nevertheless, the evidence provides less support for hypotheses predicting worse performance and failure of RFs, and, more generally, of WMFs like Ben-Ner and Jun (1996). Apparently, all workers of failed CFs experience a sharp fall in their subsequent earnings, regardless of whether they get a new job at another CF or they join an RF, especially if they get a job in a young firm. Considering the workers' earnings, observed RF performance is not different than that observed for similar workers in other WMFs or in CFs. Moreover, considering that employment is more stable at WMFs (Burdin and Dean, 2009), and that RFs show a longer survival, taking over a failing CF could be a good option for its workers in light of their already dark prospects.

The third research question was: what part of the observed differences in RF workers' income was associated with the preservation of characteristics of the closed CF or other initial characteristics of the RFs? The results indicate that how well RFs perform, in terms of earnings differentials, is mainly associated with their ability to preserve the scale and worker knowledge of their CF predecessors. The size of the CF that gave rise to the RF and the share of workers who participate in the new collective enterprise are important, particularly the most skilled workers. The high average age of RF founding

members also negatively impacts their subsequent earnings. The ability of RFs to retain young or skilled workers, avoid a brain drain and keep its organizational capabilities seems to be a critical issue. All of these variables describe some initial characteristics of the RFs or even the final characteristics of the failed CFs. The conversion process could have had long-term effects on firm performance. Suggesting the existence of path dependence, imprinting or organizational inertia processes (David, 1985; Hannan and Freeman, 1984; Marquis and Tilcsik, 2013; Sydow *et al.*, 2009).

The high average industry or firm tenure in their previous jobs also have negative effects on their subsequent earnings. This could be an indication that the strategy of keeping a failed CF operating in the form of an RF, thus being able to continue using the high levels of accumulated SHC, does not have all the expected results. One question that arises from this result is whether workers are not able to fully use their SHC, or if they are in fact using it and thanks to that they are avoiding even worse potential earnings losses. The first option would be the case if the firm experiences such changes during the conversion process that the failed CF and the new RF can no longer be said to be the same firm. In this case, the SHC was in fact specific to the failed CF, but no longer useful in the new RF. This could happen, for instance, if the worker had a broad knowledge of the firm's customers, but the RF lost these customers during the conversion process. In this case, it would be difficult to find an explanation for workers' incentives to keep RFs running. Instead, the second option would be more consistent with the observed results, especially if we aim to explain the longer survival of RFs.

Considering the policy implications of these results, RFs may not be the answer if policy makers want workers to keep their jobs and earnings levels. But RFs are not doomed to fail and, if project evaluation is properly done, supporting them could be a good option if the goal is for workers with already bad prospects to keep a stable job. But if policy makers do decide to support the conversion of a failed CF, it is crucial to avoid prolonged periods of inactivity, which are probably associated with the loss of organizational capabilities with long term effects on firm's performance.

The results of this study offer new information on the comparative performance of RFs, WMF-FSSs, and CFs, as well as on the different determinants of their performance. However, several questions remain open, particularly regarding the decision process of RF workers when they choose to takeover a CF. Is it convenient for them to create such a firm and keeping it running when compared to other alternatives available? in particular, what are these other alternatives or outside options? To answer these questions, more research is required with other data sources and methodological designs.

Acknowledgements. I am grateful to Virginie Pérotin, Gabriel Burdín and to seminar and conference participants at the 19th Conference of the International Association for the Economics of Participation, the 5th Pathways to a Cooperative Market Economy Workshop, Instituto de Economía (IECON-FCEA) and Departamento de Economía (DECON-FCS), Universidad de la República for their useful comments. Usual disclaimer applies.

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