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# Business models in the search for efficiency: the case of public financial intermediaries

Martina Santandrea, Tommaso Agasisti, Marco Giorgino and Andrea S. Patrucco

*This paper presents an optimal business model configuration for public financial intermediaries (PFIs). Using nonparametric techniques on Italian public financial corporations, the most efficient business models combined asset diversification and income specialization. These business models were unaffected by external financial turmoil, due to weak connections between PFIs and the traditional financial circuit; and public-private ownership is more efficient than purely public ownership, regardless of the business model adopted.*

**Keywords:** Business model; public financial corporation; technical efficiency.

The decreasing availability of public financial resources, together with increasing public spending constraints, are driving the need to evaluate the efficiency of public corporations and the spending review programmes implemented by governments attempting to prioritize public spending and increase public sector efficiency (Robinson, 2014). Public financial intermediaries (abbreviated in this paper to 'PFIs') are a significant part of the search for efficiency in public spending. PFIs are usually owned and managed by the public sector and, by providing financial services to support socio-economic development, they aim to contain public spending while providing adequate financial services to deliver essential public services.

The paper makes an important contribution in trying to identify the optimal configurations for the business models adopted by PFIs. Drawing on academic literature on diversification in the financial service industry (for example Berger *et al.*, 2000; Cummings *et al.*, 2010; Curi *et al.*, 2015), we first classify possible business model configurations of PFIs, then we use data envelopment analysis (DEA) to investigate how efficiently public managers use their resources to provide financial services (Avkiran, 1999). Data are from regional financial corporations (RFCs): the PFIs operating in Italy.

## Theoretical background

Optimal configurations of business models for financial intermediaries have been widely

addressed by both strategic management and financial management researchers. The term 'business model' has been used in a variety of ways, such as describing a company's unique value proposition (Shafer *et al.*, 2005); how a company uses its sustainable competitive advantage to perform better than its rivals over time (Stewart and Zhao, 2000); and whether, as well as how, it can generate revenues now and in the future.

Central to the business model concept is an organization's 'value chain', and how it fits into the value-creation network; in formulating their models, firms must choose the area of performance on which to focus efforts (Porter, 1985). In this regard, diversification and specialization have been presented as two alternative types of business model choice, and this dichotomy seems relevant for describing the operations of public organizations. Diversification implies entering into a different line of business in order to exploit technological and marketing synergies among different products within the same business or to exploit cost and revenue economies by diversifying the business into unrelated activities (Ramanujam and Varadarajan, 1989). Diversification can also represent costs related to the 'management of diversity' (co-ordination and monitoring costs). Specialization, on the other hand, pushes firms to focus core competencies on limited businesses in order to achieve a unique position in these markets (Porter, 1996).

Similar concepts can also be extended to traditional financial intermediaries (i.e. banks

*Martina Santandrea is a Private Equity Consultant for Oltreventure, Italy.*

*Tommaso Agasisti is Associate Professor of Public Management at Politecnico di Milano, Italy.*

*Marco Giorgino is a Full Professor of Risk Management and Corporate Finance at Politecnico di Milano, Italy.*

*Andrea Stefano Patrucco is Assistant Professor in Project and Supply Chain Management, Penn State University, USA.*

and insurance companies), whose business models differ considerably according to their characteristics. For example, for banks, business models may vary from listed and investment banks (which have a large share of non-interest income and are more dependent on non-deposit funding) to unlisted banks (which are more retail oriented and fund most of their activities by customer deposits and providing loans) (Köhler, 2015). Also for these cases, diversification can enhance economies of scope (with efficiency stemming from variety rather than volume; see Berger *et al.*, 2000), but can also create higher co-ordination costs and cross-subsidy among different services, thus producing diseconomies (Krasa and Villamil, 1992). In these cases, intermediaries can gain by specializing in their core business (Cummings *et al.*, 2010).

From a theoretical perspective, the rationale for diversification has been grounded in economies of scope, even though the convenient degree of diversification has been questioned in economic terms (Busch and Kick, 2009). In the literature on financial intermediaries, diversification has been measured according to three configurations—assets, income and funding (Curi *et al.*, 2015). Asset diversification identifies the mix of activities characterizing a business (Cerasi and Daltung, 2000). For traditional intermediaries, these assets comprise loans, shares and securities. With empirical studies suggesting that larger banks are better diversified (Paroush, 1994) and have a lower risk (Lin *et al.*, 2012), the link between asset diversification and efficiency is rooted in a better risk distribution among different activities (for example Diamond, 1984; Ramakrishnan and Thakor, 1984). Income diversification refers the mix of revenues stemming from each line of business (Busch and Kick, 2009): for traditional financial intermediaries, revenue includes interest and non-interest income and commissions. In terms of the technical efficiency of income-diversified models, evidence is mixed. Chiorazzo *et al.* (2008) found that, in Italian banks, income diversification increased the risk-adjusted returns; Lepetit *et al.* (2008) and Maudos and Solís (2009) found that more diversified banks had lower margins; and Curi *et al.* (2015) found that funding specialization was associated with greater efficiency.

### Research background

Little has been published about optimal configurations of PFIs. These types of intermediaries need to be efficient in order not to waste public money, and the policy and

funding arrangements between public sector and private sector institutions vary considerably (Biondi, 2016). For these reasons, and given their specific role and mission in the public finance sphere, they need to be studied separately.

Aligned with several studies on traditional financial intermediaries (for example Goddard *et al.*, 2008), a first relevant research motivation when exploring PFIs may be related to the level of efficiency of their business models.

In this paper we define the optimal business model with respect to the ‘technical efficiency’ of an organization, i.e. how well management deploys technology, staff and other resources to produce a given output (Wheelock and Wilson, 1995). As PFIs are supported by public funds, in the set of inputs that these intermediaries use to transform output, governmental support is also included, thus making the search for their optimal configuration even more relevant to the public domain.

Independent of their optimality, it is also important to analyse whether business models change over time, by considering the external financial pressures caused by the sovereign debt crisis. Since PFIs play a key role in broadening access to credit for companies and individuals (Bengtsson, 2013), we expected that their business model would have evolved under the pressures of the financial crisis. This expectation is consistent with the evidence provided for traditional financial intermediaries, with many banks changing their orientation during the financial crisis (Curi *et al.*, 2015). Furthermore, banks’ business models are dynamic to external financial turmoil since they respond to changes in the macroeconomic situation, regulatory and budget constraints (Llewellyn, 2013).

PFIs are subject to ongoing debate as to whether they would be better managed if they involved private sector shareholders (Mikkelsen *et al.*, 1997). On the one hand, mixed ownership structures can generate conflicts of interest between the private sector partners’ interests and the public mandate of the corporation, but private shareholders can put pressure on public-oriented managerial procedures thus enhancing overall performances. Therefore we looked at whether mixed ownership financial intermediaries are more efficient than purely public sector ones (in any configuration setting). This is crucial to our understanding about whether public–private partnerships can be helpful in improving the way public money is used, at least with respect to sustaining local

growth.

## Methodology

### *Data and descriptive statistics*

We used Italian regional financial companies (RFCs) as our unit of analysis. According to Haslam *et al.* (2012), intermediaries' business models can be classified according to their mission, stakeholders' relations, funding objectives and mix of activities. The public mandate of RFCs is to support the socio-economic development of the geographical region in which they operate through the provision of different financial services such as equity investments, guarantees, consulting services and management of public funds (Fondazione Rosselli, 2014).

Each RFC can decide either to specialize or to diversify its activity, making it suitable for an investigation into the efficiency of diverse configurations of assets, income and funding. Furthermore, an RFC's majority shareholder is the regional public authority, but some RFCs involve minor private sector shareholders and are, as a result, useful for exploring the relationships between ownership structure, business models and efficiency.

Our sample was 20 RFCs (covering 18 out of the 20 Italian regions; see table 1). The dataset was a five-year balanced panel data from 2008 to 2012 comprising the balance sheets, profit and loss accounts and income statements for each company.

### *Approach*

To analyse the optimal business model for PFIs, we followed the two-step method already adopted by Curi *et al.* (2015) for the banking system. First, we calculated diversification indexes for the different business model configurations of PFIs, using a Gaussian kernel density estimator to categorize business models as specialized or diversified taking into consideration their possible configurations of assets, income and funding. This meant we could decide whether business models were homogeneous or heterogeneous.

Following the literature on traditional financial intermediaries (for example Diamond, 1984), we measured diversification in assets, funding and income by adjusting it for the specific characteristics of PFIs subtracting the Herfindahl-Hirschman index from unity so that it increased with diversification.

**Table 1. Sample description.**

<i>Region</i>	<i>RFC name</i>	<i>Ownership structure</i>		<i>Average IC ('000 euro) (2008-2012)</i>
Valle d'Aosta	Finaosta SpA	100%	Regional authority	1.817.621
	Finpemente SpA	97%	Regional authority	719.575
Piemonte	Filse SpA	3%	Other public local authorities	354.063
		80%	Regional authority	
Liguria	Finlombarda SpA	20%	Other public local authorities	1.376.051
		100%	Regional authority	
Lombardia	Tecnofin	100%	Public local authorities	162.391
		Trentino Alto Adige	Veneto Sviluppo SpA	51%
Veneto	Friulia SpA			49%
		78%	Regional authority	
Friuli Venezia Giulia	Ervet SpA	22%	Private financial intermediaries	14.927
		100%	Regional authority	
Emilia Romagna	Fiditoscana SpA	50%	Regional authority	485.393
		50%	Private financial intermediaries	
Toscana	Gepafin SpA	42%	Regional authority	95.486
		12%	Sviluppumbria	
Umbria	Sviluppumbria SpA	46%	Private financial intermediaries	56.506
		92%	Regional authority	
Marche	SRGM	8%	Other public local authorities	48.565
		100%	Public local authorities	
Lazio	Filas SpA	100%	Regional authority	172.777
		Sviluppo Lazio SpA	80,5%	Regional authority
Abruzzo	FIRA		19,5%	Other public local authorities
		51%	Regional authority	
Molise	Finmolise SpA	49%	Private financial intermediaries	144.026
		100%	Regional authority	
Puglia	Puglia Sviluppo SpA	100%	Regional authority	40.996
Basilicata	Sviluppo Basilicata SpA	100%	Regional authority	58.110
Calabria	Fincalabra SpA	100%	Regional authority	96.858
Sardegna	SFIRS SpA	100%	Regional authority	469.707
Average				414.841
Standard deviation				488.958

Asset diversification identifies the mix of activities characterizing the business of PFIs. The index includes shares and participations (PART) identifying the equity investments of PFIs, securities (SEC) including fixed-income securities, government securities and other financial securities, and account receivable (AR) from the services provided to private sector entities or public bodies. The index was computed for each RFC ('j') in any time ('t'), where TA is the sum of numerators—see equation 1.

Funding diversification included equity (EQUITY), debt (DEBT) and public funds managed on-balance sheet (onFUND) or off-balance sheet (offFUND). Unlike traditional financial intermediaries, public authorities can endow public financial intermediaries with public funds. Such funds are accounted on-balance sheet if the risks are on the behalf of the financial intermediary and off-balance otherwise. TF is the sum of numerators—see equation 2.

Income diversification includes interest on financial activities and loans (IF), dividends (DIV), revenues from managed funds (RF) and revenues from consulting services (RS). TI is the sum of numerators—see equation 3.

We next measured the technical efficiency of RFCs using a data envelopment analysis (DEA) output-oriented model. DEA is a non-parametric linear programming technique for measuring the relative efficiency of a set of

similar units (DMUs); efficiency is represented by the ratio of weighted outputs to weighted inputs, and thus it is in line with our definition. The underlying construct of DEA is the 'efficient production frontier' that relates maximal output to inputs for each DMU (Charnes *et al.*, 1978).

*Input and output selection:* Consistent with Berger and Humphrey (1997), financial institutions can be studied using a production or intermediation approach. The production approach considers financial institutions as production units using a set of inputs (for example labour and capital) to produce transactions. The second approach ('intermediation') considers financial institutions as intermediaries between borrowers and savers; inputs are generally loans, labour and capital, while outputs are the loan and savings volumes. For our purposes, the intermediation approach was the best, since RFCs intermediate between the public authority and borrowers by providing different services: equity investments to companies, guarantees to companies and individuals, consulting services and, management of public funds. RFCs rely on their own resources (i.e. total assets) and on public funds they collect from public authorities (mainly Italian regions) and from international institutions (for example European Union funds); from a balance sheet perspective, invested capital corresponds to

$$ADIV_{j,t} = 1 - \left( \left( \frac{PART}{TA} \right)_{j,t}^2 + \left( \frac{SEC}{TA} \right)_{j,t}^2 + \left( \frac{AR}{TA} \right)_{j,t}^2 \right) \quad (1)$$

$$FDIV_{j,t} = 1 - \left( \left( \frac{EQUITY}{TF} \right)_{j,t}^2 + \left( \frac{DEBT}{TF} \right)_{j,t}^2 + \left( \frac{onFUND}{TF} \right)_{j,t}^2 + \left( \frac{offFUND}{TF} \right)_{j,t}^2 \right) \quad (2)$$

$$\min \sum_{i=1}^m v_i x_{io} + v \quad (3)$$

subject to:

$$\sum_{i=1}^m v_i x_{ij} - \sum_{r=1}^s w_r y_{rj} + v \geq 0$$

$$\sum_{r=1}^s w_r y_{ro} = 1 \quad (\text{normalisation constraint})$$

$w_r, v_i \geq 0$  (where  $v$  is free in sign in the VRS model and  $v = 0$  in the CRS model)

**Table 2. Input and output specification.**

<i>Approach</i>	<i>Specification</i>
Intermediation	Input Invested capital (IC) = Total assets (including public funds on balance sheet) + public funds off balance sheet Output Equity investments in companies (EQUITY) Released guarantees (G) Revenues from consulting services (RS) Revenues on managed funds (RF)

the debt, equity and public funds of RFCs which are used to produce the outputs of the model. Table 2 describes our selected input and outputs.

An output-oriented approach (i.e. maximization of outputs given a level of inputs) is used, assuming that the level of input for each RFC is known while the level of services provided depends on the technical efficiency of each RFC. Indeed, RFCs have limited control over the inputs since the resources they manage depend on the decisions of the regional public authority that, acting as a major shareholder, identifies the size of RFCs as well as the amount of resources to be deployed. Given that amount of resources, RFCs have to maximize the provision of outputs.

*Model specification:* We applied an output-oriented model using both constant and variable returns to scale (hereafter CRS and VRS respectively). The efficiency scores under the CRS model were not affected by the orientation mode, while by using a VRS model the magnitude of efficiency scores (but not the ranking) could change (Avkiran, 1999). The CRS model compared each DMU against all others, while the VRS compared each DMU against those of similar size.

To assess efficiency, we used a 'window analysis approach' (Charnes *et al.*, 1985), in order to provide discriminatory results, even within a small sample. Window analysis works on the principle of moving averages; the efficiency of each DMU in each period is compared to its efficiency in other periods and to the efficiency of other DMUs. We used a sequential frontier that accumulated observations annually, resulting in more stable productivity measures and a reduction in the scope of the dimensionality problem (Tulkens and Vanden Eeckaut, 1995). We had five-yearly data for 20 DMUs ( $N = 20$ ); we selected a three-year window and, therefore, we analysed 60 DMUs for each window, respectively. A window of three years is large enough to get a sufficient sample size, but still small enough to allow for technical changes.

To assess whether business models have changed over time, we split our panel data into two subsamples: the first comprised observations for the years 2008 to 2009 (including the global financial crisis); the second comprised observations for the 2010 to 2012 (accounting for the Italian sovereign debt crisis). In this way, and by comparing results across the two time-spans, we were able to see whether the business model of RFCs evolved during the sovereign debt crisis compared to the previous period.

Considering the ownership structure, we again split the sample into purely public sector owned companies and mixed companies (including the RFCs with private sector shareholders—mainly banks). Therefore we knew whether the business models associated with mixed companies differed from the ones adopted by purely public companies.

In both cases (i.e. comparing two different time frames, and comparing public versus public/private institutions), a non-parametric equality test allowed us to assess whether the two groups of observations actually differed statistically.

## Results

Using STATA 14, we applied a Gaussian kernel density estimator with automatic optimal bandwidth selection (Sheather and Jones, 1991), to assess the homogeneity of business models across different RFCs. Business models were identified using thresholds located between peaks in the estimated distributions. The peaks on the left-hand side of figure 1 represent specialized business models, while the peaks on the right-hand side represent diversified business models.

Our asset diversification index highlights the coexistence of two groups of RFCs: the right-hand peak comprises the most asset diversified intermediaries (peak around 50%), while the left-hand peak signals the more specialized ones. In-between peaks suggest that RFCs adopt more heterogeneous business models. The threshold for asset diversification is approximately 30%.

**Table 3. Non-parametric tests for equality of distributions across time and types of ownership.**

	<i>Mann-Whitney, U-test</i> <i>p value</i>	<i>Kolmogorov-Smirnov test</i> <i>p value</i>	<i>Decision on H0</i>
$H_0$			
ADIV: pdf (2008-2009) = pdf (2010-2012)	0.905	0.938	Do not reject
FDIV: pdf (2008-2009) = pdf (2010-2012)	0.860	0.911	Do not reject
IDIV: pdf (2008-2009) = pdf (2010-2012)	0.311	0.604	Do not reject
$H_0$			
ADIV: pdf (only public) = pdf (public and private)	0.003	0.001	Reject
FDIV: pdf (only public) = pdf (public and private)	0.514	0.395	Do not reject
IDIV: pdf (only public) = pdf (public and private)	0.010	0.016	Reject

Funding diversification shows that business models are more homogeneous, since the index distribution is not characterized by peaks. Furthermore, we could not reject the hypothesis that FDIV follows a normal distribution (Shapiro-Francia  $p$  value: 0.187, Shapiro-Wilk  $p$  value: 0.093), thus confirming that RFCs adopt similar business models. Even if business models are almost homogeneous, the overall amount of funding resources has increased over time.

Income diversification suggests the coexistence of two groups of companies: the most income-diversified companies (peak around 60%) are on the right-hand side of figure 1, while on the left-hand side are the

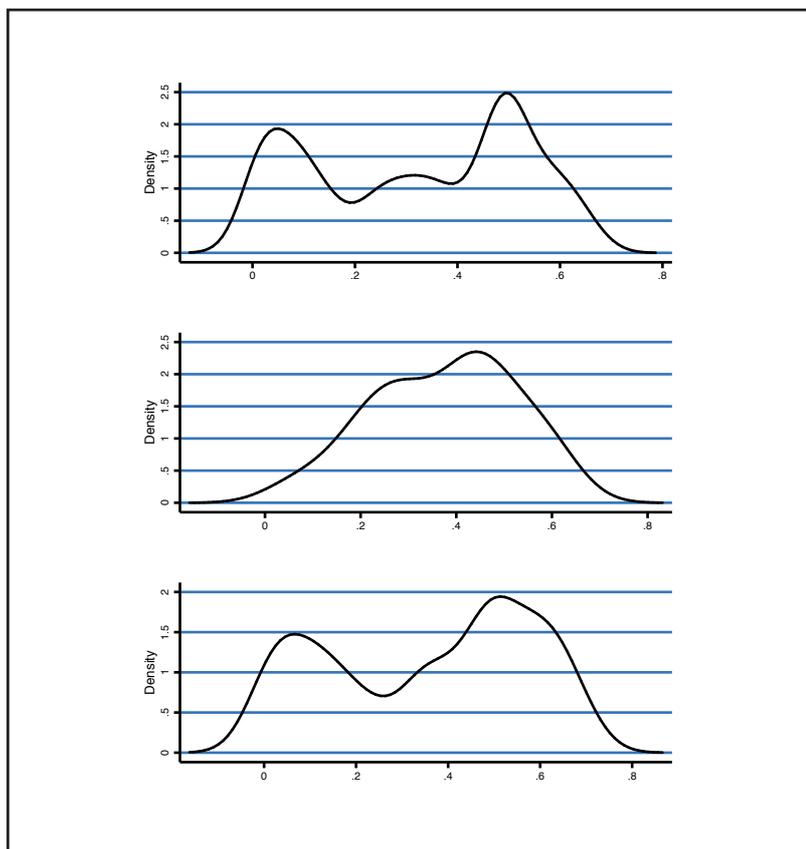
most income-specialized (peak around 10%).

Table 3 presents the results of the non-parametric tests. In both cases, the null hypothesis asserts that the samples are drawn from the same distribution. From the first test, we could not reject the hypothesis that business models follow the same distribution over time, which suggests that business models are not dynamic to external financial turmoil. From the second test, we inferred that purely public and mixed companies differ significantly in how they organize their sources of assets and income.

Finally, to assess the technical efficiency of RFCs, we solved both CRS and VRS models; we used VRS technical efficiency scores since RFCs are very different in size and can be subjected to scale efficiency. Considering the heterogeneity of business models, we can investigate optimal business model configurations using DEA-based technical efficiency scores: scores for each RFC are given by the distance from the actual observation to the DEA, calculated using the Farrell's output-oriented measure (see table 4 and Farrell, 1957).

We first divided the sample into specialized and diversified RFCs considering asset and income configurations (as RFCs adopt almost the same configurations of funding). Then we investigated the most efficient configuration by considering the whole sample of RFCs as well as their differentiation in the ownership structure. Finally, we calculated the mean of the technical efficiency scores for each cluster (i.e. combination of income-asset configuration). See table 5.

The most efficient configuration results were for asset diversification and income specialization, independent of the ownership structure. Furthermore, mixed ownership structures were generally more efficient than purely public ownership structures in almost all of our configurations.

**Figure 1. Kernel density estimator.**

**Table 4. Efficiency scores.**

<i>DMU name</i>	<i>Scale efficiency score</i>	<i>DMU name</i>	<i>Scale efficiency score</i>
ERVET 2008	0.98	FRIULIA 2008	0.85
ERVET 2009	1.00	FRIULIA 2009	0.85
ERVET 2010	0.92	FRIULIA 2010	0.86
ERVET 2011	0.96	FRIULIA 2011	0.89
ERVET 2012	0.96	FRIULIA 2012	0.90
FIDITOSCANA 2008	0.56	GEPAFIN 2008	0.82
FIDITOSCANA 2009	0.61	GEPAFIN 2009	0.83
FIDITOSCANA 2010	0.74	GEPAFIN 2010	0.86
FIDITOSCANA 2011	0.79	GEPAFIN 2011	0.90
FIDITOSCANA 2012	0.85	GEPAFIN 2012	0.99
FILAS 2008	1.00	PUGLIA SVILUPPO 2008	0.17
FILAS 2009	0.95	PUGLIA SVILUPPO 2009	0.78
FILAS 2010	0.90	PUGLIA SVILUPPO 2010	0.81
FILAS 2011	0.94	PUGLIA SVILUPPO 2011	0.36
FILAS 2012	0.96	PUGLIA SVILUPPO 2012	0.40
FILSE 2008	0.78	SFIRS 2008	0.93
FILSE 2009	0.77	SFIRS 2009	0.87
FILSE 2010	0.59	SFIRS 2010	0.67
FILSE 2011	0.60	SFIRS 2011	0.68
FILSE 2012	0.56	SFIRS 2012	0.63
FINAOSTA 2008	0.08	SRGM 2008	1.00
FINAOSTA 2009	0.13	SRGM 2009	0.97
FINAOSTA 2010	0.14	SRGM 2010	0.91
FINAOSTA 2011	0.18	SRGM 2011	0.93
FINAOSTA 2012	0.20	SRGM 2012	0.99
FINCALABRA 2008	0.82	SVILUPPO BASILICATA 2008	0.43
FINCALABRA 2009	0.81	SVILUPPO BASILICATA 2009	0.81
FINCALABRA 2010	0.92	SVILUPPO BASILICATA 2010	0.81
FINCALABRA 2011	1.00	SVILUPPO BASILICATA 2011	0.69
FINCALABRA 2012	0.96	SVILUPPO BASILICATA 2012	0.59
FINLOMBARDA 2008	0.09	SVILUPPO LAZIO 2008	0.70
FINLOMBARDA 2009	0.14	SVILUPPO LAZIO 2009	0.69
FINLOMBARDA 2010	0.12	SVILUPPO LAZIO 2010	0.68
FINLOMBARDA 2011	0.12	SVILUPPO LAZIO 2011	0.48
FINLOMBARDA 2012	0.09	SVILUPPO LAZIO 2012	0.35
FINMOLISE 2008	0.98	SVILUPPUMBRIA 2008	0.96
FINMOLISE 2009	0.98	SVILUPPUMBRIA 2009	0.86
FINMOLISE 2010	0.99	SVILUPPUMBRIA 2010	0.93
FINMOLISE 2011	0.97	SVILUPPUMBRIA 2011	0.93
FINMOLISE 2012	0.97	SVILUPPUMBRIA 2012	0.96
FINPIEMONTE 2008	0.50	TECNOFIN 2008	1.00
FINPIEMONTE 2009	0.27	TECNOFIN 2009	1.00
FINPIEMONTE 2010	0.28	TECNOFIN 2010	1.00
FINPIEMONTE 2011	0.29	TECNOFIN 2011	0.99
FINPIEMONTE 2012	0.38	TECNOFIN 2012	1.00
FIRA 2008	0.51	VENETO SVILUPPO 2008	0.65
FIRA 2009	0.65	VENETO SVILUPPO 2009	0.48
FIRA 2010	0.79	VENETO SVILUPPO 2010	0.44
FIRA 2011	0.81	VENETO SVILUPPO 2011	0.43
FIRA 2012	0.92	VENETO SVILUPPO 2012	0.41

**Discussion***Business models and efficiency*

Our results suggest that RFCs adopt different business model configurations in terms of assets and income, while they are almost homogeneous in terms of funding (characterized by equity and public funds with a very limited use of debt). In particular, we found that the combination of asset diversification and income specialization is associated with a greater technical efficiency; diversification of assets helps RFCs split the risk across a greater set of activities (Diamond, 1984). While purely financial activities can be deemed to have greater volatility, accounts

receivable are less volatile and can help to reduce the overall risk. The specialization of RFCs in a few of these activities is associated with a greater efficiency, as specialization increases the skills of managers in specific lines of business, decreases co-ordination costs, and avoids cross-subsidy of non-productive activities (Maudos and Solís, 2009). So it is not surprising that asset diversification scores of higher efficiency are associated with income specialization, as income diversification may result in inefficiencies for RFCs, as diversification requires the acquisition of a new set of skills that may reduce the technical efficiency of the overall activity. Significantly,

**Table 5. Technical efficiency and business model configurations.**

<i>All*</i>	<i>Purely public ownership**</i>		<i>Mixed ownership***</i>			
	<i>Asset diversified Mean efficiency</i>	<i>Asset specialized Mean efficiency</i>	<i>Asset diversified Mean efficiency</i>	<i>Asset specialized Mean efficiency</i>	<i>Asset diversified Mean efficiency</i>	<i>Asset specialized Mean efficiency</i>
Income diversified Mean efficiency	0.582 (32)	0.573 (31)	0.506 (25)	0.543 (24)	0.712 (15)	0.583 (10)
Income specialized Mean efficiency	0.742 (25)	0.596 (12)	0.726 (14)	0.657 (10)	0.804 (5)	0.240 (1)

( ) No. of observations.

\*The diversification threshold is set at 30% for both asset and income.

\*\*The diversification threshold is set at 30% for asset and 25% for income.

\*\*\*The diversification threshold is set at 20% for asset and 25% for income.

the source of income in which efficient RFCs decide to specialize is not relevant—greater efficiency of specialization is therefore independent of income, rather than being related to diseconomies of scope. This is consistent with the empirical studies on traditional financial intermediaries, where gains from specialization arise from the focus on the core business and the core competences (Cummings *et al.*, 2010), rather than the type of service provided.

#### *The static nature of business models*

From panel data analysis, the evidence shows that RFCs' business models did not significantly changed over the period of analysis. As such, we conclude that PFI business models are *not* dynamic to external financial pressures. This result contrasts the dynamicity of business models of traditional financial intermediaries that substantially evolve over time in order to respond to the constraints imposed by the financial crisis (Köhler, 2015).

There are two interpretations for this result. On the one hand, RFCs are less exposed to external financial pressures due to their limited connection with the traditional credit circuit (and higher connection with the public sector), and are therefore being less sensitive to external financial turmoil. On the other hand, RFCs are pursuing a 'public mandate' requiring them to provide funds in times of crisis to support the socio-economic development of the region in which they operate (Fondazione Rosselli, 2014). Indeed, despite the financial and sovereign debt crisis, RFCs grew—they managed an increasing amount of public funds despite external financial pressures.

#### *Ownership and efficiency*

Our analysis shows that mixed companies have a higher efficiency in almost all configurations of assets and income. This is consistent with the literature which suggests that mixed companies are better managed than purely public ones

(for example Lepetit *et al.*, 2008). Overall, technical efficiency first depends upon the ability of public managers to run their business, and the presence of private sector shareholders can put pressure on them to run their activities efficiently. Therefore, if the main aim of investing public money in RFCs is to stimulate economic growth in an efficient way, then a form of public–private partnership should be preferred.

#### **Conclusions**

Our study is the first attempt to identify an optimal business model configuration for PFIs (with optimality being defined in terms of technical efficiency), by focusing on RFCs as unit of analysis. Our results show the coexistence of both specialized and diversified business models in assets and income configurations, with homogeneity in terms of funding. The study also suggests that, despite the financial crisis, RFCs have not significantly changed their business models, with their mix of activities, income and funding remaining almost the same in the face of external financial pressures.

Heterogeneity of PFIs' business models underpins the analysis of the most efficient configurations, with asset diversified and income-specialized business models being characterized by higher efficiency scores. On the one hand, asset diversification can provide a better risk distribution across different assets, while on the other hand, income specialization allows for focusing on a few, highly productive services. This configuration is the most efficient, independent of the ownership structure, even though mixed companies are generally more efficient than purely public ones.

It is worth noting that asset diversification and income specialization (even if correlated with higher efficiency) could violate RFCs' public mandates by imposing the provision of different services to support evolving societal needs and the territory in which they operate; excessive specialization can lead to within-

region imbalances in the provision of services, as cross-regional provision of such services is not allowed.

To conclude, policy-makers looking to increase efficiency should consider the possible trade-off between optimal configurations of PFIs and their public mandate and mission. Although the adoption of suboptimal business models can result in a waste of public resources, these business models may be better able to support a PFI's mission, thereby effectively contributing to the socio-economic development of the territory in which that PFI operates. As such, future research needs to investigate this trade-off in more detail, in order to identify tools and procedures to improve the productivity of PFI business model configurations without compromising their public mandate.

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## IMPACT

This paper has important lessons for policy-makers and practitioners:

- Efficient business models for public financial intermediaries combine asset diversification and income specialization, but policy-makers should be aware that excessive specialization can lead to within-region imbalances in the provision of services.
- Business models seem to be unaffected by external financial pressures: therefore they are a good source of funds to support socio-economic development in times of crisis.
- Public-private ownership is more efficient than purely public ownership.

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