

Teaching Case: Liquidity or Solvency, Who is to Blame? The Economic-Financial Analysis of a Financial Institution

Abstract

Objective: The objective of this teaching case is to illustrate the use of liquidity and solvency concepts to support long-term strategic decision making.

Method: Through a teaching case, general and specific questions are analyzed for discussion in undergraduate and lato sensu graduate programs in Accountancy, Business Administration and Economics.

Results: Bank Y experienced the fast growth of its credit portfolio in recent years, based on a term extension strategy that was not accompanied to the same extent by its equity, leading to increased leverage and the compression of regulatory capital. Dissatisfied, the partners disagreed on the causes of the failure: a liquidity problem due to the credit portfolio extension strategy or a solvency problem as, besides non-liquid, was the portfolio also defaulting?

Contributions: The development of this analysis through a case study offers an additional perspective to understand the concepts involved, especially the liquidity and solvency of financial institutions, beyond the traditional problem-solving analysis.

Key words: Liquidity. Solvency. Risk. Decision making.

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1. Introduction

Bank Y is a medium-sized financial institution (FI), specialized in granting loans to companies in the middle market segment and in structured operations backed by bank credit bills (BCBs). BCBs can be held in a portfolio or assigned to investors and investment funds in which Bank Y holds part of the quotas. Its main sources of funding are time deposits and credit assignments to investment funds and pension funds.

Bank Y presented a rapid growth in the loan portfolio in recent years, supported by a term extension strategy. This growth was not accompanied to the same extent by its net equity, leading to an increase of its leverage and the compression of its regulatory capital. In view of the dilemma, represented by the capacity to originate credit in a volume that exceeds the regulatory limit to keep it in the portfolio, Bank Y has adopted the distribution of credit surplus to the regulatory limit to qualified investors, especially pension funds (directly or through investment funds), as a complementary business model. The disposal of such credit of course implied a substantial transfer of risks and benefits in order to eliminate the impact on the regulatory capital.

The strategy adopted by Bank Y, together with its business model, proved to be unsatisfactory though. The loan portfolio showed to be excessively long and possibly defaulted. The resulting potential losses could jeopardize the Bank's regulatory capital, which would send signals of difficulty to the market. Consequently, the risk of a "run" to deposits was one of the possible scenarios and, depending on the intensity of these redemptions, there would be no liquidity available to meet their obligations. In this case, intervention by the regulator would no longer be a risk but a certainty.

Aware of the condition of Bank Y, its partners disagreed as to its causes: would it be a liquidity problem as a consequence of the strategy of extending the credit operations, which allowed the bank to rapidly expand the portfolio; or would it also be a solvency problem as, besides being illiquid, the portfolio would also be in default, jeopardizing the foundations of the entity? It was essential to determine the answer, since the solution to be adopted would be different depending on this diagnosis.

Thus, the partners needed to decide what course to take. To assist in decision making, they hired an independent company to perform a due diligence process (investigation and audit). The work involved, in addition to an analysis of the figures in general, a specific analysis of the credit portfolio, which is the main business of the entity. As a result of this investigation, an opinion would be prepared on the situation of Bank Y, presenting proposals to solve the problems detected.

The justification for the present study is based on the fact that companies' liquidity and solvency are extremely relevant when it comes to decision-making in the analysis of entities' going concern, especially financial institutions. In this particular case, financial crisis events are capable of impacting the lives of millions of people. The subprime crisis in 2008, motivated by the granting of high-risk mortgage loans, culminated in the bankruptcy of the traditional Lehman Brothers investment bank and high state intervention in the US financial system. In this sense, the analysis of the solvency and liquidity indicators is fundamental in anticipating bankruptcy events that may unfold into systemic crises, largely affecting the financial system.

2. Due Diligence – General View of Bank Y

The due diligence procedure started with a baseline analysis of the bank's figures. Table 1 displays the evolution of Bank Y's main accounting balances.

Table 1

Main accounting items between Dec/2013 and Dec/2016 (in million Reais)

Cosif	Accounting Item	2013	2014	2015	2016
1.0.0.00.00-7	ASSETS	851	2,893	4,346	6,452
1.1.0.00.00-6	Available cash	6	16	76	54
1.2.0.00.00-5	Liquid Financial Applications	46	125	117	40
1.3.0.00.00-4	Marketable Securities (MS)	220	1,058	1,337	1,876
1.3.100.00-7	MS - Free	126	504	596	941
1.3.1.15.00-9	MS - Investment Fund Quotas	33	95	270	602
1.3.2.00.00-0	MS - Others	61	459	471	333
1.6.0.00.00-1	Credit Operations	462	1,592	2,729	4,410
1.8.0.00.00-9	Other credits	117	102	87	72
4.0.0.00.00-8	LIABILITIES	789	2,740	4,029	6,012
4.1.0.00.00-7	Deposits	509	1,996	3,002	4,479
4.9.0.00.00-9	Other liabilities	280	624	674	736
4.3.0.00.00-5	Agricultural Credit Bills, Real Estate Credit Bills, Debentures	-	120	353	797
6.0.0.00.00-2	NET EQUITY	62	153	317	440

Source: elaborated by the authors.

The data analysis reveals that Bank Y maintains high exposure to credit risk in its balance sheet, either directly through credit operations or indirectly, through quotas of funds backed by credit operations. Combined, the two instruments expanded their exposure to credit risk by approximately ten times in four years. On the other hand, the Net Equity (NE), as the basis of the regulatory capital, increased by only seven times, revealing an increase by 42% in the leverage of the credit portfolio in relation to the NE.

From the liquidity point of view, the information available in Table 2 is contradictory. While indices based on net assets (such as the ratio of net assets to NE and the ratio of net assets to liabilities) were relatively stable, when comparing the year 2013 with the year 2016, the free cash indices declined significantly. This drop is justified by the more rigorous criterion used in the calculation of the latter indices, which does not include investment fund quotas, which are considered in the indices based on net assets.

Table 2

Liquidity indicators between Dec/2013 and Dec/2016

Accounting items	2013	2014	2015	2016
Net Assets ^ψ / NE	438.7%	783.6%	482.6%	447.7%
Free Cash ^ω / NE	287.1%	421.5%	248.9%	235.2%
Liquidity Index(1): Liquid Assets/Liabilities	34.4%	43.7%	37.9%	32.7%
Liquidity Index 2): Free Cash/Liabilities	22.6%	23.5%	19.6%	17.2%

^ψ Liquid assets are the sum of available resources, interfinancial liquid applications and marketable securities (MS).

^ω Free cash is the sum of available resources, interfinancial liquid applications and free marketable securities. Therefore, it excludes the fund quotas, which are not liquid assets.

Source: elaborated by the authors.

The liquidity ratio calculated based on the net assets dropped from 34.4% to 32.7%. As the share of investment funds in total Securities (MSs) increased from 15.0% in 2013 to 32.1% in 2016, the liquidity ratio (2) calculated based on the free cash excludes the fund quotas) dropped from 22.6% to 17.2%, representing a severe reduction in the liquidity of Bank Y. Thus, the risk of Bank Y not satisfying the possible redemption of its funding left it at imminent risk of a liquidity crisis.

Table 3 below shows the performance of Bank Y's Basel Capital Index (IB) and Reference Equity (RE), as well as its main components. The observed values in relation to these indicators are much less worrisome than the liquidity observed in Table 2. The reduction of the IB from 17.6% in 2013 to 14.5% in 2016 is understandable and reveals a concern with the profitability of the capital, and does not indicate a solvency problem, since the value of IB for 2016 (14.5%) was well above the regulatory floor of 11%.

Table 3

Behavior of regulatory capital and solvency indices between Dec/2013 and Dec/2016 (in million Reais)

Accounting items	2013	2014	2015	2016
Reference Equity (RE) ^ψ	124	289	587	869
RE Level I ^Ω	83	227	499	747
RE Level II ^ω	41	62	88	122
Basel Index	17.6%	11.7%	13.8%	14.5%

^ψ the reference equity is the sum of RE Level I and RE Level II.

^Ω RE Level I comprises the sum of the Core Capital and the Complementary Capital, and corresponds to the less volatile part of the NE, such as the social capital and the profit reserves.

^ω RE Level II comprises the FI's Subordinated Debt, and corresponds to the more volatile part of the NE, such as the capital reserves and the equity valuation adjustments.

Source: elaborated by the authors.

The composition of the accounting profit in the last four years reflects the transformation the equity structure of Bank Y underwent in the same period. The accelerated growth in the Bank's activities, especially the credit portfolio, increased the net income from R\$ 8.6 million in 2013 to R\$ 89.4 million in 2015. As a reflection of the revenues from the credit portfolio, the investment in securities and the provision of structuring services for credit operations (sale of credit operations to investment funds), profitability reached 19.7% of the NE in 2015.

In 2016, despite a significant increase in its financial intermediation revenues, Bank Y recorded a net profit 29% lower than in the previous year, due to the increase in estimated losses with uncertain settlement credits, funding expenses and administrative expenses. In fact, administrative expenses corresponded to more than twice the result of the Bank's financial intermediation. In addition, pre-income tax profits were 85% lower than in the previous year, as shown in Table 4.

Table 4

Income statement between Dec/2013 and Dec/2016 (in thousands Reais)

	2013	2014	2015	2016
Income from Credit Operations	207,446	161,354	466,906	722,036
Earnings from Expenses and Reversals of Provisions for Bad Credits	(12,043)	(75,381)	(92,867)	(172,633)
Earnings from Marketable Securities	42,609	66,976	121,715	191,178
Earnings from Currency Exchange and Investments in Foreign Currencies	39,629	24,043	30,831	36,388
Revenues from Financial Intermediation	277,641	176,992	526,585	776,969
Funding Expenses	(124,366)	(136,977)	(342,917)	(556,865)
Exchange Expenses	(3,075)	(16,083)	(15,502)	(25,334)
Expenses from Financial Intermediation	(127,441)	(153,060)	(358,419)	(582,199)
INCOME FROM FINANCIAL INTERMEDIATION	150,200	23,932	168,166	194,770
Revenues from Services	66,164	142,605	141,872	195,046
Income from Equity Holdings	(72)	51,688	135,366	145,985
Other Operational Revenues	591	1,075	2,651	8,429
Administrative Expenses	(189,820)	(135,262)	(320,838)	(470,473)
Other Operational Expenses	(17,535)	(23,774)	(46,830)	(60,494)
Other Operational Income / Expenses	(140,672)	36,332	(87,779)	(181,507)
OPERATIONAL INCOME	9,528	60,264	80,387	13,263
Non-Operational Revenues	1,476	531	3,920	10,164
Non-Operational Expenses	(38)	(340)	(821)	(11,303)
Non-Operational Income	1,438	191	3,099	(1,139)
INCOME BEFORE INCOME TAXES	10,966	60,455	83,486	12,124
Income Tax and Social Contribution	(2,381)	(12,028)	5,962	51,105
NET PROFIT	8,585	48,427	89,448	63,229

Source: elaborated by the authors.

After the closing of the year ended December 31, 2016, the shareholders convened an Extraordinary General Meeting (EGM) to discuss the situation of Bank Y. They realized that they needed to review their strategy and, consequently, their business model. For this purpose, the EGM decided to hire a company specialized in financial analysis and auditing. This company should issue an exempt opinion, especially on its credit portfolio, since there was no consensus among the members about the reasons that led Bank Y to the current situation.

3. Due Diligence – Specific View of Bank Y: the Credit Portfolio

The significant increase in Bank Y's credit portfolio occurred as a consequence of the concession of excessively long operations and with financial flows displaced to the end of the contracts. Such a portfolio configuration imposed on the entity a condition of low cash generation in credit assets, requiring successive rolling of liabilities until maturity. From the regulatory point of view, the Bank's strategy was profitable, as long and illiquid operations are well remunerated and the reflection on results and regulatory capital was positive. From the liquidity point of view, however, it represented high exposure to a potential crisis of confidence that would drain deposits, in addition to the risk of default.

In view of the above, the case of Bank Y is emblematic. The expressive growth of its credit portfolio focused on long operations, mainly associated with the development of real estate projects. These operations are characterized by the shift of the receipt flows to the end of the contracts, on average of three to five years, when the projects reach maturity, as well as by the low participation of other banks in the financing of the operation. The combination of these characteristics created two problems for Bank Y: (i) the maturity mismatch between assets and liabilities, which imposes successive rollovers of liabilities until the maturity of the assets, which is considered critical for banks that do not have an agency network and therefore do not have easy access to stable liabilities; and (ii) the low visibility of the client's credit risk, as the low frequency and the low representativeness of the payment flows prevent close monitoring and delay actions aimed at risk mitigation and / or credit recovery.

Table 5 presents the evolution of the share of exclusive clients (debtors of Bank Y only), concentrated (more than 90% of exposure in the national financial system of these clients is due to Bank Y) and common (exposure is shared with other FIs). The share of common customers in Bank Y's portfolio dropped from 70.4% in Dec/2013 to 45.5% in Dec/2016, which was absorbed by exclusive and concentrated customers, which increased from 29.2% to 54.4% in the same period.

Table 5

Distribution of the credit portfolio (AC) by client situation between Dec/2013 and Dec/2016 (in thousands Reais)

Clients' Situation	Dec/2013		Dec/2014		Dec/2015		Dec/2016	
	AC	%	AC	%	AC	%	AC	%
Exclusive Clients	54,072	11.7	210,183	13.2	439,421	16.1	1,076,071	24.4
Concentrated Clients	80,877	17.5	374,190	23.5	679,602	24.9	1,323,038	30.0
Common Clients	325,358	70.4	1,004,739	63.1	1,607,572	58.9	2,006,608	45.5
Other	1,849	0.4	3,184	0.2	2,729	0.1	4,411	0.1
Total	462,156		1,592,296		2,729,324		4,410,128	

Source: elaborated by the authors.

The Central Bank of Brazil requires FIs to rank their credits in nine levels, in descending order of risk, including credits that are not overdue (AA and A), delays of up to 60 days (B and C), delays between 61 and 120 days (D and E) and delays above 121 days (E and onwards). Table 6 presents the behavior of the distribution of Bank Y's credit portfolio by risk levels between December 2013 and December 2016. An increase in the portfolio portion classified at the worst risk levels (D onwards) is observed, which rose from 3.9% to 59.7% of the total in the period. In addition to long maturities and all the resulting liquidity consequences, the bank's portfolio also presented problems of default, which made it doubly problematic.

Table 6

Distribution of the active portfolio by risk levels between Dec/2013 and Dec/2016 (in thousands Reais)

Risk level	Dec/13		Dec/14		Dec/15		Dec/16	
	CA	%	CA	%	CA	%	CA	%
AA	81.339	17,6	584.373	36,7	1.154.504	42,3	136.714	3,1
A	176.544	38,2	487.243	30,6	892.489	32,7	687.979	15,6
B	160.830	34,8	328.013	20,6	251.098	9,2	471.884	10,7
C	25.419	5,5	108.276	6,8	207.429	7,6	480.704	10,9
D	5.546	1,2	30.254	1,9	51.857	1,9	851.155	19,3
E	1.849	0,4	41.400	2,6	40.940	1,5	723.261	16,4
F	462	0,1	1.592	0,1	68.233	2,5	335.170	7,6
G	4.159	0,9	158	0,0	27.293	1,0	401.322	9,1
H	6.008	1,3	10.987	0,7	35.481	1,3	321.939	7,3
Total	462.156		1.592.296		2.729.324		4.410.128	

Obs.: i) AC, active credit portfolio; ii) the risk levels AA, A, B, C, D E, F, G and H require minimal provisions on the debt balance of the operations, corresponding to 0%, 0.5%, 1%, 3%, 10%, 30%, 50%, 70% and 100%, respectively.

Source: elaborated by the authors.

Table 7 presents the Credit Realization Index (CRI) of seven FIs during the second half of 2016. The CRI is the ratio between the flow received in the credit portfolio, i.e. the total repayments and the expected flow. Therefore, it represents the percentage of financial realization associated with the loan portfolio in the month. Bank Y has a significantly lower IRC than the other banks, all of them operating in the same market segment. This indicator is of very immediate interpretation and denotes a frustration in Bank Y's expected receivables, which are well below its main competitors. In the second half of 2016, the indicator did not exceed 60% in any month, while its worst competitor in this area, Bank 5, had no CRI lower than 70%.

Table 7

Behavior of the CRI among Peers between July 2016 and December 2016 (in %)

Bank	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6
Bank 1	92.0	93.5	86.8	93.5	93.6	94.9
Bank 2	89.7	90.0	84.9	102.2	92.5	90.1
Bank 3	89.4	93.4	86.2	93.4	90.0	87.8
Bank 4	72.7	79.0	83.6	83.0	84.1	83.9
Bank 5	71.1	79.6	71.8	70.5	79.8	73.8
Bank 6	83.6	78.2	75.6	76.9	76.3	79.1
Bank Y	58.4	46.8	47.4	51.5	53.1	59.0

Source: elaborated by the authors.

Table 8 complements the strictly financial analysis initiated in Table 7. While the former confronts actual and expected receipts, it says nothing about the relevance of these receipts to the total portfolio. A high CRI, denoting the actual fulfillment of the expected receipts, may represent an insignificant percentage of the portfolio and, finally, may be less representative in financial terms than a smaller CRI, but substantial compared to the credit stock that originated it. Thus, for a complete financial view of the credit portfolio, it is necessary to consider the Credit Liquidity Index (CLI), which relates the received flows to the credit stock, reflecting how much of the portfolio was monetized in the month. Bank Y presents a negligible CLI compared to its competitors, without reaching a CLI of more than 1% in the last six months of 2016, while its worst performing competitor (Bank 5) did not have a CLI below 3.3%. Assuming that this is standard behavior, the effective maturity of the portfolio would be infinite, which means that its balance would grow indefinitely, as the received values do not even match the appropriate interests in the operations.

Table 8

Behavior of the CLI among Peers between July 2016 and December 2016 (in %)

Bank	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6
Bank 1	7.7	6.	8.4	11.4	7.0	9.2
Bank 2	6.7	7.2	4.8	8.8	8.1	8.7
Bank 3	6.8	6.6	5.2	5.7	5.9	7.6
Bank 4	5.6	5.7	4.6	6.3	4.2	8.7
Bank 5	5.4	6.4	5.8	6.4	3.3	4.2
Bank 6	7.2	6.0	5.8	6.1	5.5	6.2
Bank Y	0.2	0.2	0.2	0.3	0.6	0.9

Source: elaborated by the authors.

Bank Y definitely does not generate enough cash to maintain the bank's business, which needed to turn to other means to honor its needs for cash.

The due diligence had not been concluded yet when the partners, concerned with the increasing problems and the tension involving the bank's businesses, requested the material produced thus far for them to judge the bank's situation.

3. Questions for discussion

To develop the case, next, general and specific questions are proposed with a view to reaching the objective of the exercise.

3.1 General questions

1. What is the role of the solvency-based banking regulation and how does it intend to minimize the risk of bankruptcy of banks?
2. As the "raw material" of the banking industry is liquidity, how does it contribute to the economic-financial analysis of a FI?
3. After all, is Bank Y's problem related to solvency, liquidity or both?

3.2 Specific questions

1. The text describes the mismatch between the growth of the NE and of the operational assets (credit operations and investment fund quotas) in detail. What measures could Bank Y consider to reduce this asymmetry?
2. In view of the strategy Bank Y adopted and assuming that there are no restrictions on the action of banking regulators, what measure could the latter have imposed and what could have avoided the excessive mismatch of maturities Bank Y assumed?
3. As the low liquidity of Bank Y's credit portfolio derived not only from the operation extension strategy in search of higher returns, but also from the default, what measure could the bank have taken to acknowledge its losses without this indicating financial problems?

4. Teaching notes

In this topic, the characteristics and actions are presented that permeate the teaching case proposed here. Initially, the educational objectives are presented, followed by the theoretical framework, a suggestion for a teaching plan and, finally, the analysis of the general and specific questions for this case.

4.1 Educational objectives

This is an instrumental case, centered on the analysis of the implications of variables associated to the concepts of liquidity and solvency, involving a banking firm. The case presents the evolution of the entity's operating behavior, with emphasis on the credit portfolio. The case was conceived for discussion in undergraduate and post-graduate courses in accounting, business administration and economics.

As a requirement for the discussion of the teaching case in the classroom, it is necessary to revisit the concepts of liquidity and solvency, in addition to others specific to the banking industry. In this way, a revision should be done from a generalist perspective, along the lines of the traditional economic-financial analysis, as well as from a specific perspective, considering the particularities of the banking segment. There is also a brief discussion about the conceptual justifications for regulating a market and the instruments adopted in banking regulation. Issues such as the crises that have affected financial institutions, especially the most recent ones, can be addressed, culminating in a much greater regulation in this market, demonstrating the sensitivity of this segment.

With these elements at hand, students will be able to easily proceed in the case and, at the end of the course, will be able to understand: (i) the implications of solvency and liquidity in the financial equilibrium of an FI; (ii) the implications of the mismatch of liquidity in an IF; (iii) the consequences of excessive extension and low cash production of a credit portfolio for the liquidity risk of an FI; and (iv) the impossibility of solvency-based banking regulation to capture the liquidity risk incurred by an FI.

4.2 Theoretical framework

4.2.1 Causes of bankruptcy: the dilemma between solvency and liquidity

Banks are converters of maturities: converting net liabilities into illiquid assets is the reason for the existence of a bank and is also the characteristic that enables financial intermediation (Diamond & Dybvig, 1983). The role of liquidity provider assumed by the banks implies the internalization of the transformation of maturities into the figure of the liquidity mismatch though and, consequently, they become vulnerable to the runs on banks. Minsky (1986) addressed this structural mismatch in his “Financial Fragility Hypothesis,” in which banks are considered intrinsically fragile, since the maturity horizon of assets is necessarily longer than that of liabilities, requiring the rolling of the latter in some cases. The greater the mismatch, the greater the financial fragility of the entity.

Financial institutions promise their current account clients instant access to their money and, at the same time, make long-term loans to companies and individuals. This incompatibility between the liquidity of the bank’s liabilities (deposits) and most of its assets (loans) is only possible because the number of depositors is large enough so that the bank can be sure that all clients will not withdraw their money (Brealey, Myers & Allen, 2011).

An operating and healthy financial system is essential to economic development. Successive bank failures throughout history have motivated the constitution of safeguards that would minimize the effect of these events on the economy. The first of these countermeasures was liquidity assistance, later called the “Last Resort Loan”, and the creation of central banks as the bodies responsible for coordinating such interventions. Subsequently, depositor protection, a limited liability insurance, was established to compensate depositors of insolvent banks. Finally, and more broadly, banking regulation was set up, a set of regulatory and supervisory mechanisms for the purpose of prudential action and avoiding bankruptcy. Despite this, there are several cases of FIs that, even after the most severe regulation, went bankrupt.

There is no consensus, however, about the events that trigger bank failure, and as a consequence, the regulation of this sector oscillates between different approaches of debatable practical effect: sometimes the focus is on the transformation of maturities, and regulation turns to liquidity; sometimes the focus is on the protection of the depositor and the regulation turns to solvency.

In the past, in order to minimize the liquidity mismatch between assets and liabilities, the financial system was sliced into specific market niches, which could be exploited by defined types of financial institutions. This model of “financial architecture” was adopted in a mild version in the United States (Glass-Steagal Law / 1933) and in a more severe version in Brazil, according to Law 4595/1964. In the Brazilian version, liabilities were also predefined, limiting the mismatch of liquidity by force in various market niches.

More recently, the protection of the depositor, as a strategy to minimize the risk of a looting race, came to dominate the regulatory scenario, consolidating a solvency view. The minimum risk-based capital requirement, as defined by the Basel Capital Accords, has become the central regulatory axis. The international financial crisis unleashed in 2008 and the failure of regulation to anticipate it, or even to minimize its effects, necessitated a revision of the then-current approach. Although regulation based on risk / solvency has undergone several repairs, it has not been abandoned. However, the pendulum swung back into liquidity and the outlook is for a joint solvency / liquidity approach to be implemented in the coming years.

Another important aspect in the comparison between solvency and liquidity refers to the nature of the information that composes these indicators. The Basel Index (BI), considered the solvency indicator par excellence, is economic in nature and presents a strong accounting bias. Its training dynamics privilege accounting balances and results, leaving behind the financial aspects intrinsic to banking activities. It is therefore liable to be manipulated insofar as there is broad discretion in the calculation of the accounting profit in the banking activity, or in the adjustment to the market of financial assets and liabilities (especially those of level 3 in the hierarchy of fair value, which are measured by means of internal premises and not data observable in the market, with a high degree of subjectivity), or in the constitution of provisions for estimated losses with uncertain settlement credits. And this possibility gains certainty as the BI is the internationally accepted sign of bank health. Thus, maintaining the BI at satisfactory levels, or at least above the regulatory floor, is a survival strategy adopted by FIs (Francis & Osborne, 2012). On the other hand, liquidity indices can be elaborated based on less manipulative and therefore more reliable information, especially in the banking segment, where liquidity reserves are usually made up of easily verifiable financial assets. It is therefore assumed that liquidity indices have an explanatory potential higher than BI, in case the economic and financial situation of FIs is valued. Moreover, as highlighted by Brealey et al. (2011), we should take into account when assessing the liquidity of a company that assets that are apparently liquid have a bad habit of becoming illiquid, as occurred during the subprime mortgage crisis in 2008, when some financial institutions created funds known as structured investment vehicles (SIVs), issuing short-term debt backed by residential mortgages. As mortgage default rates began to rise, the market for these debt securities was no longer attractive and investors, forced to sell their papers, found that such securities were worth less than half the face value.

4.2.2 Credit and its implications for solvency and liquidity

The average maturity of a credit portfolio is very illustrative of the implications of solvency and liquidity for the stability or fragility of a financial institution.

Disregarding credit risk and, by extension, the effect of estimated losses with uncertain settlement credits, the lengthening of the credit portfolio does not in any way compromise the appropriation of income. On the contrary, since the appropriation of income is competence-based and independent of the cash generation, the accounting result produced by the credit portfolio will be better the longer the average term of this portfolio, since it will be exposed to the effect of interests. The same reasoning is applicable to the reflex on the regulatory capital, whose central element is the NE, and the most relevant input is the accounting income. The extension of the credit portfolio, therefore, has positive effects on both the result and the regulatory capital, which derives from it.

The same is not true for the liquidity of this portfolio, considered here from the cash generation perspective. Minsky (1986), in his “Hypothesis of Financial Fragility”, proposes the existence of three types of financing structures for active positions in the market: hedge, speculative and ponzi. These structures are characterized by different relationships between the expected cash flows arising from the company’s operating activity or the financial assets it holds, and the cash flows to be disbursed to honor obligations contracted to finance them.

The hedge structure presents temporal compatibility between the cash flows of the assets and the liabilities that finance them, being insensitive to external liquidity shocks, that is, it is financially stable. The speculative structure, in turn, presents an unfavorable mismatch between the active and passive cash flows and requires that the liabilities be refinanced until the assets mature and generate enough cash to honor them. This structure is vulnerable to external liquidity shocks, since the refusal of creditors to roll their positions would lead to default of the firm. Finally, the ponzi structure is the illiquidity extreme of the spectrum, in which the assets do not generate any cash generation in the assets until they mature. In this period, the liabilities will have to be refinanced indefinitely, until enough cash is generated to honor them.

Delimiting the generalization of Minsky (1986) for the banking industry and limiting cash-generating assets to credit portfolios, we observed the coexistence of the three financing regimes with predominance of the speculative regime. In this sense, it is reasonable to assume that the composition of credit portfolios under the financing regimes is a fundamental condition to determine the degree of financial stability of the FI and the financial system as a whole. In this sense, the greater the participation of speculative and ponzi regimes in the credit portfolio of a FI, the greater its vulnerability to external shocks and the lower its financial stability.

The analysis of financial structures proposed by Minsky (1986) as credit assets would make it possible to rewrite them as follows: (i) credit operations that finance activities that generate sufficient cash to meet the contractual commitments constitute a hedge structure; (ii) credit operations that finance activities that generate cash in the long term and require constant short or medium term refinancing correspond to the speculative structure (the feasibility of this structure depends on cash generation capable of honoring debt interests and normal market functioning, allowing the principal of the debt to be renegotiated); and (iii) credit operations that finance activities based on the value of the guarantees constituted rather than the anticipation of the expected cash flows constitute a ponzi structure. The feasibility of this financing structure, which may arise from a renegotiation of a speculative unit that has deteriorated, depends on the expected value of the asset given as collateral (Minsky, 1986).

To illustrate the argument, we simulate the behavior, from the point of view of the result and the liquidity (cash generation), of a bank whose only asset is a loan portfolio, shown in Figure 1. The credit portfolio in question obeys a ponzi financing structure, with no payments, neither interest nor principal, in the window of analysis.

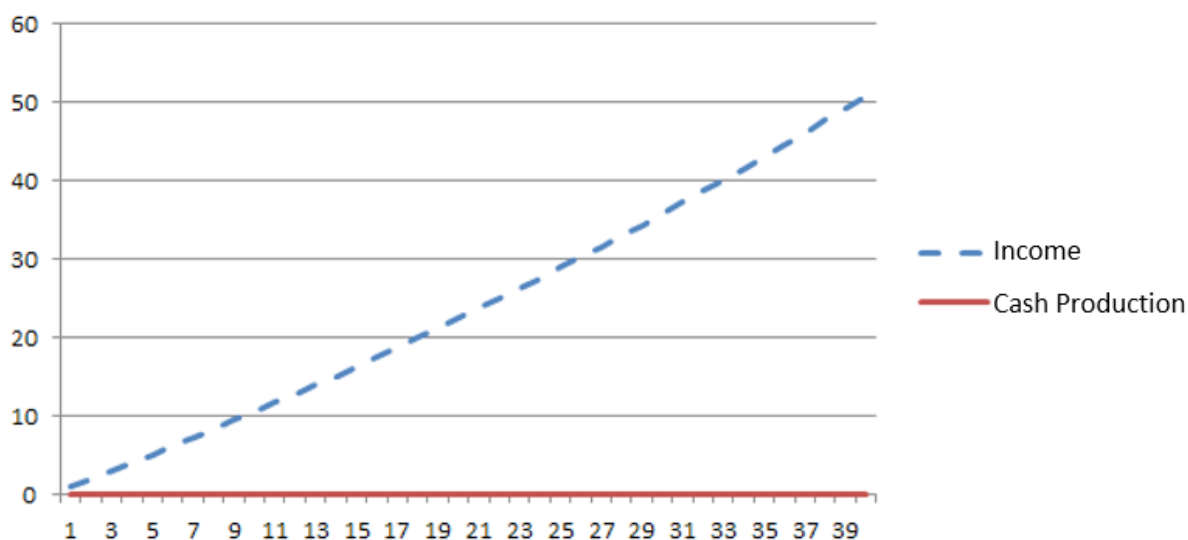


Figure 1. Accounting income and cash production of an asset with infinite maturity

Source: elaborated by the authors.

The behaviors of the income and cash generation are radically opposite: while the appropriate result in the credit portfolio expands significantly, cash generation is zero. As a consequence, the capital of the entity and, consequently, its solvency is inflated, whereas there is no liquidity, as the asset in question is illiquid. Thus, the maintenance of illiquid assets contributes to make the entity more solvent, although illiquid, the opposite of what should be expected for an FI. It is clear that, as the credit portfolio becomes more illiquid, the FI becomes more dependent on the willingness of its creditors to finance it. In other words, the more illiquid, the greater the FI's financial fragility to external shocks.

4.3 Suggested teaching plan

This case was designed for use in a 120-minute session, involving the discussion of liquidity and solvency concepts and its implication for the feasibility of a banking firm. The case study should be carried out with students familiar with concepts of economic-financial analysis, since the discussion extrapolates the general concepts of liquidity and solvency to the peculiarities of a financial institution.

The information presented in the case, especially regarding the credit portfolio, does not belong to the students' daily life. Therefore, the case must be delivered in advance to be studied and to consult the bibliography in advance. The discussion of known events of bankruptcy or "bankruptcy" of financial institutions, in addition to the serious financial crises behind them, is also interesting and will motivate students' greater involvement in the case.

The session can start by discussing the case in small groups for about 30 minutes. The objective of this initial phase is to ask the students to opine on the liquidity and solvency situation of Bank Y and the reasons that underlie this position. At the end of this phase, the teacher can ask a general question to the class, such as: "After all, is the problem of Bank Y solvency or liquidity?", presenting the reasons that support both options.

It is quite reasonable that there is a polarization between the alternatives and the role of the teacher will be to mediate this discussion by offering elements that corroborate or refute the assertions formulated. The teacher will be able to exemplify the students' arguments with known cases of bankruptcy of financial institutions, relating them with liquidity or solvency, as the case may be.

The outcome of the case should not focus on the choice of either alternative. As seen in item 4.2.1 of the theoretical framework, liquidity and solvency are related and non-antagonistic concepts. The decisive argument lies in the greater efficiency of the assessment of an entity's economic and financial situation from the standpoint of liquidity than from the standpoint of solvency, especially in the case of a financial institution, since liquidity involves fewer and less discretionary judgments, being based on elements that are, in general, more easily observable, closer to market reality. On the other hand, solvency is the consequence of judgments not necessarily observable. The result component that contributes significantly to the establishment of solvency derives from the accrual basis, which, as noted in item 4.2.2 of the theoretical framework, may lead to erroneous conclusions regarding the financial equilibrium of an entity, all the more if the subject of analysis is a financial institution.

4.4 Proposals for further questions

4.4.1 General questions

1. Solvency-based regulation is based on the premise that there would be optimal capital, which would be sufficient to support the risks incurred by a financial institution. This capital must correspond to at least 11% of the risk-weighted assets, in accordance with the Basel II Capital Accord. The application of this minimum percentage guarantees a maximum leverage of 9.09 times between risk-weighted assets and regulatory capital.
By limiting the exposure to risk at the level of each banking firm, it is intended to minimize its risk of bankruptcy and, by extension, the risk of contagion of this bankruptcy to the other banking firms, the so-called systemic risk.

2. Liquidity provides a more accurate measurement of a bank's economic and financial situation and could act in a complementary way to solvency. Banks are financial intermediaries and, as such, theoretically dismiss the need for capital, since they only transfer liquidity between the surplus and deficit agents of the economy. When accessing assets of the company, however, they expose depositors to a risk of loss that should be minimized. Hence the various safeguards adopted, one of them being the minimum capital or regulatory capital. Solvency is a static indicator though, which does not effectively reflect the dynamics of financial intermediation. Indicators such as the cash flow generation of the credit portfolio, which is an indicator of dynamic liquidity, are more appropriate to inform about the bank's credit risk, as well as its expectation regarding the behavior of the economy as a whole. As observed in the case of Bank Y, the fact that an FI is liquid according to the index established in the Basel Accord does not necessarily imply that it has sufficient cash generation to maintain its operations.
3. The difference between liquidity and solvency is more in the temporal dimension than in the conceptual one. It is as if liquidity behaves as a short-term solvency. In addition, time is in charge of converting one into the other. According to Goodhart (2008), liquidity and solvency are twin and often indistinguishable. An illiquid bank can quickly become insolvent and an insolvent bank illiquid. What is important to point out is that the referral of the problem is different. If the diagnosis were of a liquidity problem, the bank could also extend its liabilities and limit the creation of new long credit operations. Progressively, the maturity mismatch and the resulting liquidity risk would be minimized. In the case of a solvency problem, the solution would involve more drastic measures, such as a capital contribution from the partners and the immediate recognition of losses in credit operations. These arguments will be explored in the specific questions.

4.4.2 Specific questions

1. The origination of Bank Y's credit, at a higher rate than the increase in its capital, was enhanced by the strategy of extending the credit portfolio. The longer a credit, the more time is required for its financial settlement. The maintenance of credit for a longer time in the balance sheet generates more credit income, but it imposes regulatory capital, since credit is a risky asset with significant weighting. Thus, one way of minimizing the mismatch between risky assets (credit) and regulatory capital would be to reduce the average maturity of the credit portfolio, offsetting Bank Y's appetite for new origins.
Its strategy of investing in pension funds should also be criticized, since such investments are less able to offset credit risks, since their funding is long-term and there is a greater risk of default.
2. The maturity mismatch is a liquidity problem par excellence. Thus, the regulator could have imposed objective limits on the lengthening of the loan portfolio, minimizing the liquidity risk.
3. Credit portfolio default is a solvency problem. Thus, the repairing measure necessarily involves the recognition of these losses, which must be done concomitantly with a capital contribution compatible with these losses. This measure would be very interesting, since it would also address the issue of liquidity, capital contributions to financial institutions being necessarily made in cash.

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