

Recent Innovations in Inter-Bank Electronic Payment System in Mexico: the Role of Regulation

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BANCO DE MEXICO

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Goal and main findings

- Evaluation of the impact that regulatory measures adopted by Banco de México have on the electronic transfers market.
- In particular, measures related to removal of some barriers for adoption and price.
- For the adoption process to be successfully developed, all barriers to adoption have to be eliminated.
- We find that relative price significantly affect the adoption process. Consumers are price sensitive.
- We find that the process of adoption is not homogeneous across banks.
- SPEI's character has changed from a large value payment system to a widely used system for low value transactions.

Goal and main findings

- One of Banco de Mexico's (BM) main responsibilities is the proper functioning of the payment systems.
- BM's law includes authority to regulate the payments industry and to promote the use of the most efficient payment means.
- The Interbank Electronic Payment System (SPEI) is owned and operated by BM.
- SPEI is aimed at sending electronic transfers between financial institutions and their clients and started to work in August 2004.
- During this period, BM has promoted a number of institutional changes, regulatory measures and agreements with institutions in order to foster SPEI's usage.
- Role of regulatory threat.

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SPEI's Technical Features

1. The issuer account holder instructs his bank via Internet to make a transfer through SPEI.
2. Provided the costumer's account has enough funds to perform the transaction and all security checkpoints have been cleared, the issuer institution sends to BM a digitally signed instruction to transfer the money.
3. BM verifies the syntax and digital signature of the transfer. If everything is correct, an acknowledgement is sent to the issuer and the transfer is queued to be processed in the next settlement cycle
4. If the issuer institution has enough liquidity, the transfer is settled in the next settlement cycle and both issuing and receiving institution are notified.
5. After the receiving institution gets the notification, it credits the amount of the transfer in the beneficiary's account

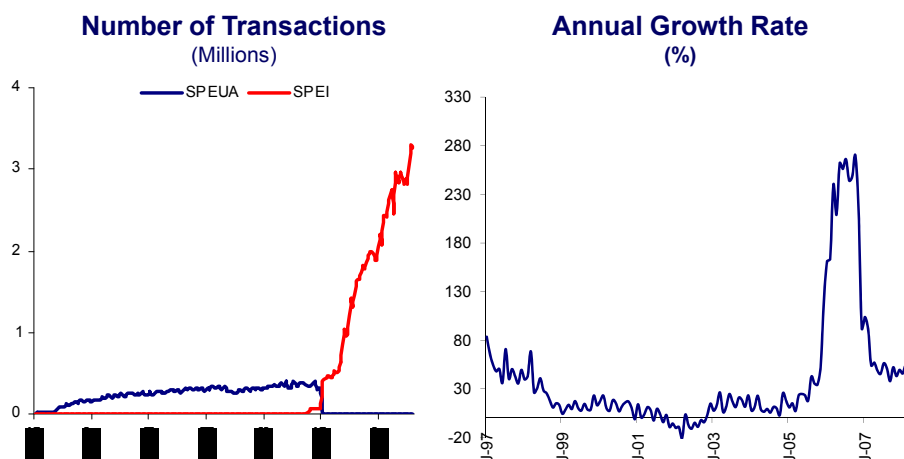
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Evolution of SPEI

- SPEI started to function in August 2004 and substituted SPEUA, another electronic transfers system.
- The behavior of SPEI differs from the adoption process experienced by SPEUA. Since its introduction, SPEI has been adopted at high rates, achieving during the last years an average annual accumulated rate of growth of 50%.
- Thus SPEI did not only take over the transactions previously carried out with SPEUA but it has increased dramatically the processing of low value operations.
- The rate of adoption of SPEI is heterogeneous across transaction value brackets; while low and medium value transfers are showing the highest growth rates, large value transactions are growing at stable rates.
- As a consequence, the average transaction has decreased across time.

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Evolution of SPEI

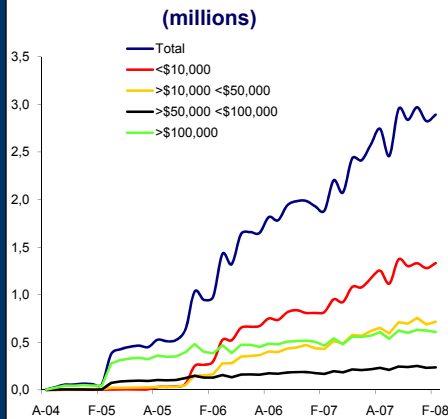


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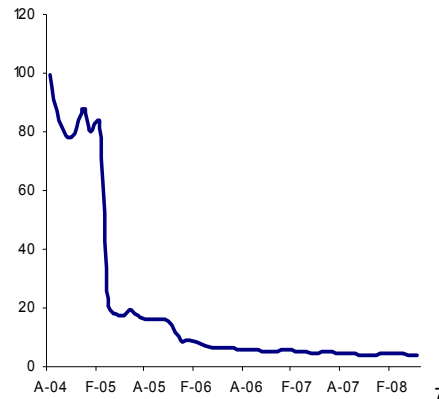
Evolution of SPEI

- What explains this behavior?
- Is it just demand variables or is there a role for public policies?

Number of Transactions by amount



Average transaction
(Million pesos)



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Evolution of SPEI

- Express the number of payments of closest substitutes as the total (SPEI, TEF, checks and direct debits), SPEI shows the most dynamic behavior.
- It seems that SPEI is displacing checks.

Structure of close substitute electronic transactions
%

Year	SPEI	EFT	Direct Debit	Checks
2005	2.9	8.8	1.6	86.6
2006	9.3	8.5	2.4	79.7
2007	13.9	8.9	3.1	74.1
2008	18.9	10.1	3.8	67.2

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Regulation and Institutional Changes

Relevant information	Start date
SPEI enters	Aug-04
SPEUA shuts down	Mar-05
Generalized provision of SPEI through Internet	July-05
Sender identification standard is set	
Removal of minimum amount in SPEI	Dec-05
Price cap agreement (not price setting)	Mar-06
Per transaction fee reduction from 1 to 0.5 pesos	Apr-06
Non-banks entry to SPEI	May-06
Introduction of MISPEI	Sep-07
Elimination of fix fee	Jan-08
Per transaction fee reduction to 0.1 pesos on transactions processed at night	Feb-08

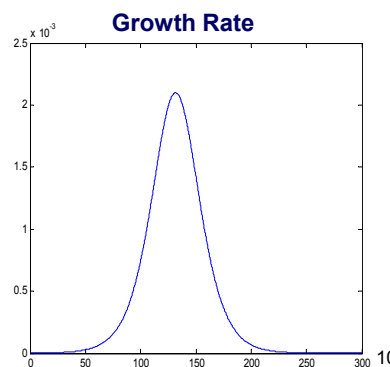
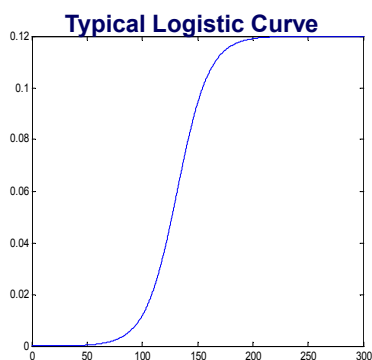
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Methodology

- Adoption is modeled using a logistic curve (symmetric S).

$$S_t = \frac{a}{1 + c \exp(-bt)} + e_t$$

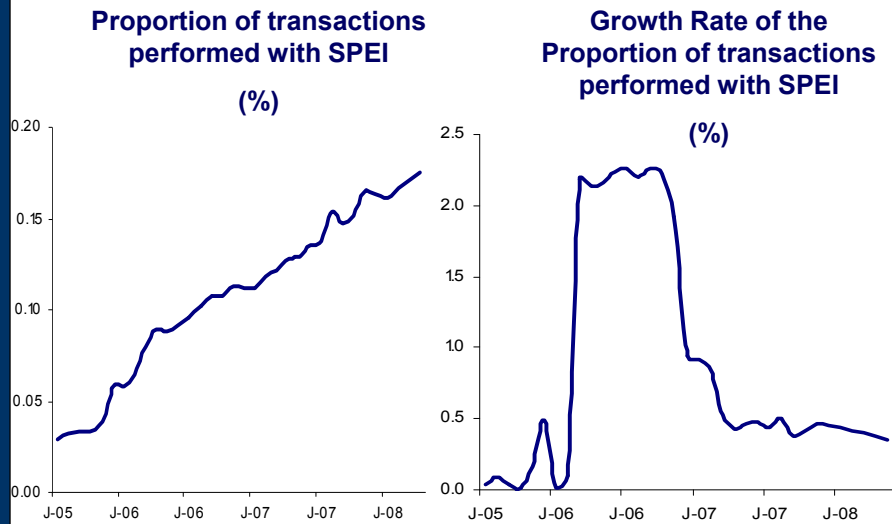
- S_t is the proportion of transactions carried out with SPEI, (SPEI transactions over the total number of substitute **interbank** payments).
- a is the saturation point; b is a positive function of the slope of the curve (rate of adoption) and c is the inflection point.



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Methodology

- How well does the S_t fit SPEI's data (proportion)?



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Methodology and parameters specification

- Have BM measures affected SPEI's adoption? We use SPEI's monthly aggregated data (proportion). We model the parameters of interest in the following way:

$$a = \beta_i X_i + \delta_j D_j$$

$$b = \gamma_i X_i + \phi_j D_j$$

where X_i is a matrix of demand variables that could affect SPEI's adoption (economic activity and number of accounts)

D is a dummy variable matrix for the moment when each regulation or agreement started and X_i stands for demand control variables

- Does adoption differ by bank? We use quarterly information of SPEI (proportion) disaggregated at the bank level (8 largest banks), from March 2006 to March 2008. Modeling the parameters:

$$a_1 = a_k B_k + \beta_i X_i + \delta D$$

$$a_2 = a_k B_k + \beta_i X_i + \delta D + \lambda_k B_k D$$

$$b = b_j B_j + \gamma X_i$$

Where $a_k B_k$ is the specific bank effect and $\lambda_k B_k D$ is the interaction term 12

Hypotheses at aggregated level

- SPEI prices may be a relevant variable for the adoption process: However, we did not include because we do not have the series. Nevertheless, they may not show enough volatility.
- Adoption requirements for extensive adoption:
 - Identifications standards setting
 - Provision of the service through Internet.
- Therefore, beginning of analysis March 2005 (to August 2008).
- We test two events at the aggregate level are:
 1. Removal of the minimum amount to send a transaction through SPEI.
 2. Bank agreement to impose a cap on SPEI's price.

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Aggregate Results

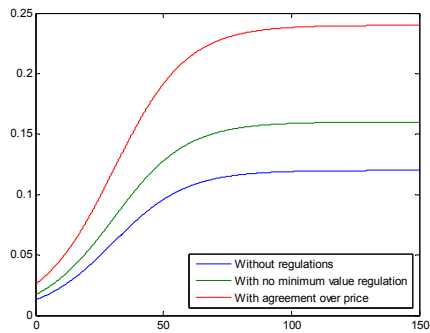
Variables	I	II	III	IV
Saturation Point (a)	0.17 ***	0.12 ***	0.27***	0.24* **
Rate of adoption (b)	0.13 ***	0.07 ***	0.10***	0.07* **
Inflexion point (c)	23.44 ***	30.40 ***	34.08***	43.20*
Effect of measures on the saturation point				
No minimum transactions value		0.04 **		
Price reduction		0.08 ***		
Effect of measures on the rate of adoption				
No minimum value of transactions			-0.02***	
Price reduction			-0.02***	
Effect of measures on the inflexion point				
No minimum value of transactions				-4.21** **
Price reduction				-8.44*

*Significant at the 10%, **significant at the 5%, ***significant at the 1%

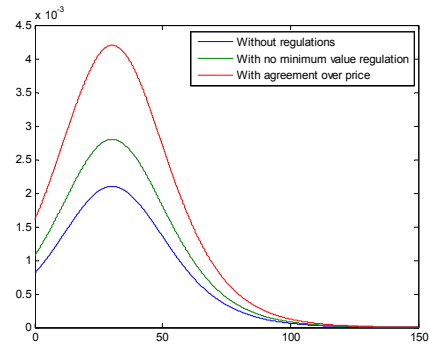
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Aggregate Results (Saturation Point)

Estimated Logistic Curve



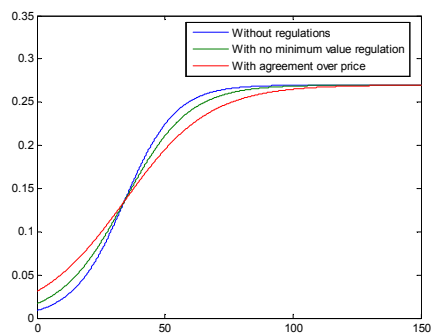
Growth Rate



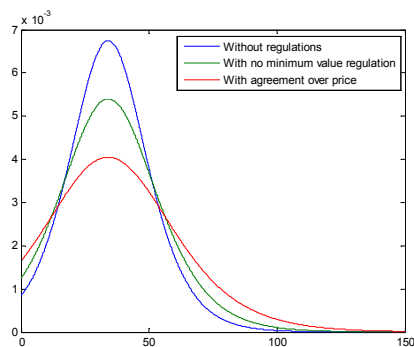
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Aggregate Results (Growth Rate)

Estimated Logistic Curve



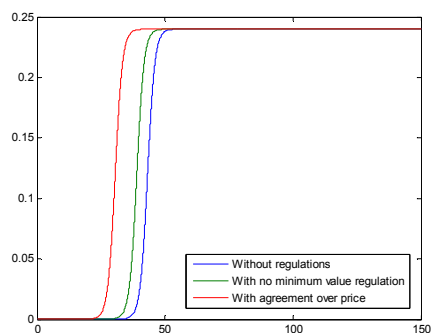
Growth Rate



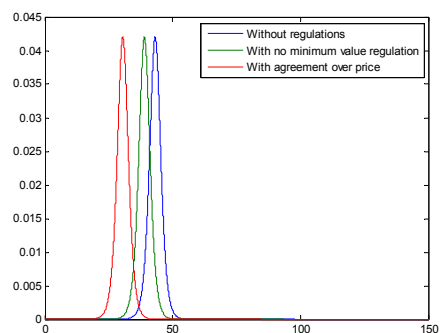
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Aggregate Results (Inflexion Point)

Estimated Logistic Curve



Growth Rate



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Hypothesis at bank level (Panel Data)

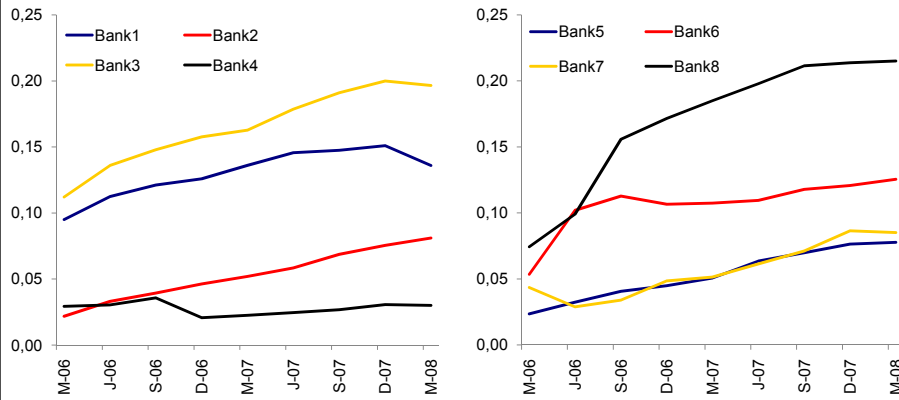
- At the bank level we estimate the combined effect of the two regulations above as it was one effect, since we have quarterly data and both effects occurred in the same quarter..
- The basic model includes dummy variables to allow for the saturation point and the growth rate of transactions to vary across institutions.
- We include 8 banks. The excluded institution is a small modern bank which mostly serves high income clients.

Institution	Mean Over the Period	Standard Deviation	Market Share at End Period (Aug/08)
Bank1	0.130	0.018	24.7
Bank2	0.053	0.020	8.3
Bank3	0.165	0.030	42.0
Bank4	0.028	0.005	3.9
Bank5	0.053	0.020	1.1
Bank6	0.106	0.021	15.1
Bank7	0.057	0.021	3.6
Bank8	0.169	0.051	1.2

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Hypothesis at bank level (Panel Data)

Adoption at the Bank Level



Source: Banco de México

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Panel Data Results

Variables	I		II		III	
Saturation point	0.22	***	0.20	***	0.22	***
Rate of adoption	0.66	***	0.61	***	0.64	***
Inflexion point	2.14	***	2.06	***	2.12	***
Effect of measures on the saturation point						
Combined measures			0.02	**		
Measures*bank1					0.04	**
Measures*bank2					0.02	
Measures*bank3					0.03	
Measures*bank4					-0.02	
Measures*bank5					0.02	
Measures*bank6					0.09	***
Measures*bank7					-0.04	

*Significant at the 10%, **significant at the 5%, ***significant at the 1%

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Hypothesis at bank level (Panel Data)

- The results show that the combined effect of measures had a positive effect on the proportion of transactions performed with SPEI.
- Almost all dummies included at the bank level affecting the saturation point and the rate of adoption are significant
- The third column shows the results of a model where the timing of the measures is interacted with bank's dummies, allowing for the effect of measures on the saturation point to be different across banks.
- The results show that, at least for two banks, it seems plausible to assert that policy measures affected bank's saturation point in a differentiated and positive way.

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Final Comments

- Banco de México has taken steps to set up an institutional environment free of obstacles for SPEI's adoption.
- SPEI has changed from a system oriented to very large value electronic transfers to a system used massively for relatively small value transactions.
- The effect of the agreement between banks to reduce the distortion existent between the price of SPEI and the prices of its substitutes, had a positive and significant effect on the saturation point.
- In terms of differences across banks, the process of adoption of SPEI is not homogeneous; banks with better Internet infrastructure and high income clients have superior adoption rates.
- Regulations affect banks in a differentiated way.

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