FINANCIAL DEVELOPMENT AND GROWTH IN SWITZERLAND

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Introduction

Any entrepreneur knows that she needs more than business know-how and manpower to turn ideas into successful and productive economic endeavours. Without investment capital entrepreneurs may not prosper and the processes or products of their innovations are unlikely to be fully adopted and exploited. Consequently, economists, politicians and investors are interested in the role that financial intermediation, the mechanism by which funds are allocated to productive activities, plays on macroeconomic development. The role and effectiveness of financial intermediation in spurring economic growth and improved welfare has been debated since the 1960's. In the 1990's, however, the amount of literature on the subject exploded. In part this interest can be attributed to Romer (1986) and others who developed endogenous growth theories. Financial liberalisation, the globalisation of capital that began in the 1970's and the ensuing explosion in the development of new financial products also contributed to the expanding interest in financial markets development theories.

This paper explores the connection between economic growth and the growth and improvement of the financial markets in Switzerland. Switzerland is a small open economy with an internationally recognized financial services sector. Today the land-locked Alpine country of about 6 million inhabitants houses the world's sixth largest stock exchange and one of the world's most efficient securities trading systems. The country is also home to two of the world's most diversified banks, Credit Suisse and UBS. As Xu's (2000) reported, a well developed financial sector, such as Switzerland's, should significantly contribute to economic growth. Switzerland's markets have historically enjoyed a cherished position as an international financial safe haven—a status that can be attributed to political stability, trusted privacy laws and a central location in Europe. However, as international tensions have eased following the fall of Communism, and as competition has escalated due to the formation of a single market in Europe, Switzerland has been forced to revamp her financial institutions and practices.

Section 2 of this paper presents the theoretical background and discusses economists' thoughts concerning how the quality of a country's financial markets are linked to the health and development of the county's economy as a whole. Section 3 examines events

that have marked the process of financial deepening in Switzerland. Empirical evidence is presented in Section 4. Section 5 concludes.

Finance and Development

"The choice of production technologies is intimately linked to the costs of trading in (and access to) liquid financial markets. It was therefore necessary that the financial revolution occur before the industrial revolution in order to provide the liquid capital markets necessary for the adoption of technologies requiring inherently illiquid capital investments." (Bencivenga, Smith and Starr, p 154)

This idea, first developed by Hicks in 1969, summarizes economists interests in financial markets. As financial markets develop and access to liquidity increases, entrepreneurs are able to engage in larger, more groundbreaking projects. The knowledge and technologies that are produced increase productivity.

There are logical benefits to having an industry specialised in determining where and how to invest. Bencivenga and Smith (1991) describe four main advantages that banks have. First they hold a large number of accounts, which leads to quite predictable withdrawal rates. Second, based on this assumption, banks know with a fair amount of certainty how much cash they need on hand, and therefore hold liquid reserves to cover the predicted withdrawal demand. Third, the liability that banks issue is more liquid than their assets. Lastly banks reduce entrepreneurs' need to self-finance. That is, entrepreneurs do not have to keep funds in unproductive, liquid forms or worry about having to liquefy investments in case of unexpected expenses. Instead, to cover short-term liquidity needs, investors can either borrow from the banks or save money in accounts that earn interest. Financial institutions enjoy economies of scale because the law of averages allows them to project about how much reserves they must keep on hand to cover account-holders liquidity demands.

Atje and Jovanovic (1993) further explain that because the riskier and more productive investments are illiquid, participating investors must rely on financial intermediaries' abilities to disperse risk and supply liquidity. They add that because financial institutions and markets can dedicate themselves to determining the potential of an investment, they can guide investors to the best investments either through research

reports which they publish or by denying or limiting credit to entrepreneurs who they believe do not have viable investment plans.

The information advantages that financial institutions possess, should diminish the harmful consequences of adverse selection, whereby asymmetric information causes the least worthy entrepreneurs to receive funding because they are most likely to need and apply for investment capital. In addition, if investment banks are able to closely track the companies in which they invest or even maintain some say in how the business is run, then financial development should the limit moral hazard worries, that companies will not behave in the interests of investors.

Similarly, Maurice Obstfeld (1994) argued that financial openness and access to international securities markets are beneficial to all parties involved. His study suggests that financial openness allows investors to share the risk among more parties, encouraging investors to fund riskier and less liquid, but more productive, schemes. By correlating risk with expected return, Obstfeld shows that, "Provided risky returns are imperfectly correlated across countries, and provided some risk-free assets are initially held, a small rise in diversification opportunities always raises expected growth as well as national welfare."

In a later paper by Bencivenga, Smith and Starr (1995), it is argued that industries which require longer gestation periods for their new technologies to be implemented are comparatively better served by developments in the financial services industries. The authors firstly state that various market participants do not always have equal access to capital through financial institutions. Citing J.R. Hicks (1969) "A Theory of Economic History," the authors explain that the Industrial Revolution, a period which spawned the maturation of the manufacturing and textile industries, could not have occurred without the financial revolution.

In addition, Rajan and Zingales (1996) tried to determine which companies benefit more from financial development by studying the sources of companies' capital. Specifically they found that industries whose firms do not possess deep enough pockets to self-finance projects have more to gain from advanced external funding methods. Therefore, as markets develop, less-firmly established companies and companies with low net cash positions should grow comparatively faster.

Expanding on these theoretical works, Levine and Zervos (1998) outline a variety of channels through which financial institutions impact economic growth. To test whether stock market liquidity and banking development do, in fact, relate positively to economic growth, the authors conducted an international empirical study of 47 countries—excluding Switzerland. They find that banking development and increased stock market liquidity do lead to economic growth, capital accumulation and productivity growth. Stock market liquidity alone, as measured by the value of stock traded in comparison to the size of the equities market or the size of the economy, caused economic and productivity growth, capital accumulation, real GDP per capita growth and bank development. This relationship between productivity growth and financial deepening holds even after controlling for initial income, educational investment, political stability, fiscal policy, openness to trade, macroeconomic stability and other measures of market efficiency.

Although Levine and Zervos (1998) do not establish whether stock market development causes economic growth or vice versa, the results do indicate a significant relationship between the two. It also indicates that the stock market does not simply follow economic growth. In addition, although stock markets are forward looking (pricing models are expectation-based) market movements and economic outcomes are not predetermined.

Interestingly, market volatility, which one might expect to represent potentially harmful instability, did not appear to affect economic growth in the work of Levine and Zervos (1998). Increased volatility did not lower investment or cause poorer resource allocation. Changes in volatility, market size and international integration failed to correlate with growth, capital accumulation and productivity growth. Increased capitalisation, however, led to higher output and capital stock growth.

If Bencivenga, Smith and Starr (1995) are correct in extending Hicks' (1969) Industrial Revolution theories to a modern economic setting, industries that entail significant start-up costs and large amounts of capital should profit more from the improvements in financial markets than an industry, which requires less long term commitment of capital. For example, the last ten years have demonstrated that computer software firms have not needed as long a gestation period for the companies to become

profitable, but pharmaceuticals or heavy industrials generally require a longer-term capital commitment. Therefore, if this line of reasoning is correct, improvements in general market openness or in the efficiency of financial intermediation may be more important for certain industries and classes of companies. However, if Rajan and Zingales' (1996) conclusions hold true, the companies that start 'poorer' should benefit more from strong financial markets. If both theories hold true, then businesses with sparse internal financing capabilities that operate in capital-intensive industries have the most to gain.

While there are clearly many advantages to the development of a financial sector, some economists have argued that the potential changes to the savings rate could mitigate some of those gains. Levine and Zervos (1998) wrote that arguments such as those presented by Obstfeld (1994) imply that liquidity and risk can ambiguously affect the savings rate. "In fact, higher returns and better risk sharing may induce savings rates to fall enough such that overall growth slows with more liquid and internationally integrated financial markers," wrote Levine and Zervos (p. 537). There is also theoretical disagreement over whether increasingly liquid stock markets will lead investors to invest in high-return projects as Bhide (1993) argues that more liquid markets make the selling of stock simpler. Similarly Shleifer and Vishny (1986) argue that liquidity discourages investors from monitoring corporate management. If they are correct, liquid markets may promote moral hazard through activities such as day-trading. If investors are less interested in companies' financial solvency and management quality and more concerned with market trends, the lack of focus on corporate fundamentals may allow for ineffective leadership to allocate resources unproductively. On a macro scale this could slow economic growth.

I. Swiss Political and Economic History

In this paper a model similar to that used by Levine and Zervos (1998) has been applied to Swiss financial and economic data from 1990 forward. The Levine and Zervos study considered a broad range of countries such as Egypt, Japan, Peru, France and the United Kingdom. This study will focus on one small, well-developed country—namely Switzerland—which, due to its unique position as a country that depends on trade

relations with its neighbours while facing significant trade barriers, may offer an interesting perspective.

There are two important ways in which the Swiss economic and business climate has changed in the last thirty years. The first trend is the liberalisation of the economy. This involves decreasing governmental regulation of markets and allowing more people to participate to a greater extent in the markets. The second trend has been the improvement of the efficiency of the markets. Consolidation of the securities trading process and the adoption of new technologies that allow markets to process trades more effectively are two key aspects of this later reform.

With the failure of the Bretton Woods system in the early 1970's Switzerland found herself struggling to control the appreciation of the Franc against the US Dollar. To quell the demand for Swiss Francs the country turned to measures that would limit foreigners' abilities to participate in the Swiss financial markets. But starting in January of 1979 when foreigners were first permitted to acquire Swiss Franc denominated assets, the country began to follow a road to greater financial transparency and openness. The Swiss government began to allow foreigners to receive interest on Swiss Franc deposits and forced companies to submit bookkeeping for international operations. Companies could no longer deceive investors into overestimating profit margins by attributing losses to foreign divisions whose results investors would not see.

Allowing pension funds to invest a larger portion of their assets in the stock markets represents another way that access to the stock market has increased. Since 1985 every business, with only a few very minor exceptions, must provide employees pension plans. But in the early 1990's roughly ten percent of pension funds were in equity-based investments. Traditionally domestic debt instruments have been the security of choice. Although the percentage of funds placed in equity has been increasing steadily (from the initial base of 10%), the rate still remained below the 30% maximum in 1993. However, the government expects demand for higher-performing equity funds to increase, and therefore has raised the maximum to 50% more recently. (Meier and Marthinsen, 1996)

The abolition of the Stamp Tax in 1993 was another interesting regulatory change. This tax, although it did not directly affect equity markets, is considered by Meier and Marthinsen (1996) and others to have stunted the growth of Swiss money

markets. The stamp tax imposed a flat rate on all bond issues and transfers. While the tax's effect was insignificant on long term positions, the tax made short term positions established in Switzerland uncompetitive to foreign markets. Therefore to reduce the comparative advantage of countries such as Luxembourg, resultng from regulatory and tax differences, the tax was abolished, effective April 1, 1993. Within weeks the volume of bond trades on the Swiss market doubled.

In February of 1995 the Swiss government passed the Swiss Federal Law on Banks and Savings Banks and the Swiss Bank Ordinance. This legislation further grayed the fading discrimination against foreign market participation. Besides allowing state-controlled regional banks to be supervised by the Swiss Bank Commission, which oversees other private banks, the move re-interpreted the definition of "foreign controlling interest" to mean that 50 percent of the voting rights could be held by foreign interest. This, in effect, decreased the number of companies regulated as foreign entities. Similarly the new laws honour agreements that foreign banks hold with the Swiss government to exempt them from special licensing conditions.

It is clear that Switzerland is continuing to pursue greater integration with international financial markets. In a May 2000 referendum Swiss voters chose to engage in greater economic ties to the European Union. It is unclear how this vote will tangibly effect Switzerland, a country which has been historically reluctant to join pacts with other countries. The Swiss Stock Exchange has also joined several partnerships with foreign stock exchanges under the guise of "greater clarity and efficiency." One such example is the stock exchange's association with the French ParisBourse, which was finalised in 1999. Gradual regulatory and financial culture changes have made further mergers more likely.

The first move to modernize the infrastructure of the trading process came in 1987, when the Tripartite Stock Exchange association installed a telephone-based communications system to rapidly relay stock price information to brokers. One of the measures they took to modernize the markets was Ring Information (RI). This allowed stock price information to be passed to rings and the office telephone exchanges of the members of the rings of the Geneva, Zurich and Basel exchanges as well as those of Lausanne, Bern and banks. RI was implemented in Geneva in March 1986, in Basel in

June 1986 and lastly in Zurich in February 1987. This allowed for the dissemination and registration of stock exchange transactions during trading hours. It also provided a very quick and automatic checking process for transactions.

In 1993 the settlement process was reformed. SEGA (Schweizerische Effekten und Giro AG) is an organisation for security settlement. SEGA was created to make domestic settlement more effective. More precisely SEGA 'warehouses' the traded securities and maintains banks accounts for transfer of assets. Since October 1993 SEGA transactions have been carried out through a computer system known as SECOM, which links electronically to the Swiss Interbank Clearing (SIC) system of the Swiss National Bank and Intersettle, the settlement organization for international trades. SECOM functions similarly to the previous system, but more efficiently, and offers additional services such as value date monitoring and cash-planning. This change also speeds the settlement process, making the market more liquid.

Perhaps the most significant event in the modernisation of the financial markets was the unification of the bourses and the establishment of an electronic trading system. Until 1996 there were three stock exchanges of any significance in Switzerland. The Zurich exchange was by far the largest, with ones in Geneva and Basel of some importance. The canton, the local government, regulated these markets, which cooperated in the form of the Tripartite Stock Exchange. There were also very small, private stock exchanges in St. Gallen, Neuchatel, Lausanne and Bern. All exchanges operated on an open cry system.

Although from the beginning of the 90's there had been much negotiation about a potential merger among the three exchanges and the Swiss Option and Financial Futures Exchange (SOFFEX) with the intention of creating a combined electronic stock exchange, such a deal seemed very unlikely in 1992. However in 1993 the three Zurich, Geneva and Basel stock exchanges announced such a merger. It was expected that the merger and the implementation of the EBS (Elekronische Borse Schweiz) system would be completed by September 1995. However as the developmental costs—not including hardware costs—of the EBS system rose from an estimated $75 million to about $110 million the launch was delayed. In 1996 the three exchanges finally merged to form the

SWX (Swiss Exchange). On August 2nd, 1996 SWX and SOFFEX trading commenced via the EBS system. (Extel Examiner, 1996)

With this change, the bid/ask spread was reduced from .2% to .15% for blue chip stocks (SWX website). During the first few days of trading there were occasional mis-trades, but the wrinkles were soon ironed out. In 1997 the system processed, confirmed and settled 90% of the exchanges average 30-50,000 daily trades within 10 minutes. This was a one to five day process at most of the larger American exchanges in 1997. Both these changes increased efficiency and probably liquidity. The decreased length of the settlement period, verifies that investors can enter and exit the market more rapidly. Indeed, the record shows that volume increased following these changes. (Johnson, 1997)

II. Analysis

We employ several macroeconomic and financial series that economists have theorized most significantly affect real GDP growth. These series include market capitalization, two measures of stock market liquidity—volume divided by market value and volume divided by GDP—, M1 or money supply, which is a proxy for bank lending, and a dummy variable that captures the effect of the adoption of the electronic stock exchange system. These series are real, quarterly values spanning the period from June 1990 through December 1999.

The interpretation of the data begins with standard regression analysis. However we are utilizing an array of financial and macroeconomic data, which is frequently non-stationary. When data are non stationary, the robustness of results from the regression based tests is suspect. The standard errors are biased so the p-values are unreliable, rendering standard regression analysis inappropriate.

Stationary series, ones that are integrated of order zero, denoted I(0), possess no trend over time, hover around and frequently cross the series' time-independent mean and will be rather unsmooth. However, macroeconomic series are frequently not I(0). Such series will not cross a particular level with any frequency. Rather, they will appear to be smooth and trend up over time, thus exhibiting the characteristic of non-stationary data. These series are considered to be integrated of order one, denoted I(1). Thus I(0) and I(1) series are significantly different and must be analysed using different methodologies.

Consequently, we will use two approaches to assess the relationship between our system of variables and economic growth; regression analysis and cointegration analysis.

So, to begin the process of analysing the series, it is important to determine whether the series are stationary or not. To this end, the Augmented Dickey-Fuller (ADF) test is employed. The ADF statistic tests whether a series is non-stationary, thus possessing a unit root. The null hypothesis of the test is that the series possesses a unit root, that is, that it is non-stationary. Therefore if the null hypothesis can be rejected, the series is assumed to be stationary.

The test is based on the estimation of the following equation,

$$\Delta X_t = \phi X_{t-1} + \sum_{i=1}^{P} \gamma \Delta X_{t-1} + e_t.$$

P, the lag length, must be chosen so that $\hat{e}_t$ is a white noise error value. ϕ and γ represent coefficients, and ΔX_t represents the change in X at time *t* (Dickey 1979, Fuller 1976). The true critical values are drawn from MacKinnon (1991).

If the series in our system of variables are determined to possess a unit root, cointegration analysis is the appropriate methodology (rather than standard regression analysis). Cointegration analysis was first developed by Granger (1983, 1986) and later refined by Granger and Lee (1989, 1990). The procedure considers two series $X_t \sim I(1)$, $Y_t \sim I(1)$. Typically linear combinations of such series will be I(1). However, if X_t and Y_t can be combined such that $Z_t = X_t - AY_t$ and Z_t is I(0) or stationary, then the series will be cointegrated.

The Augmented Dickey Fuller Test is once again used to test whether Z_t is stationary. Because the Z_t series is generated from the system, the appropriate critical values used to determine whether Z_t are I(0) are found in Hamilton (1994).

If no cointegration is present in the linear combinations, we attempt to make the series stationary by taking first differences. This produces a series of change variables. Generally speaking, we can think of variables that have been transformed through differencing as capturing the short run relationships, while level variables reflect the long run relationship(s). Standard regression analysis may then be used to determine the nature of the short run linkages between our system of financial variables.

Table 1. ***ADF Statistics (Q1 1990 - Q4 1999)***

Series	Statistic	10% Critical Value*	5% Critical Value*	1% Critical Value*
Δ Nominal GDP	-1.41756	-3.1949	-3.5279	-4.2092
Real GDP	-0.24958	-3.1949	-3.5279	-4.2092
Δ Real GDP	-2.84038	-3.1949	-3.5279	-4.2092
CPI	-2.57807	-3.1949	-3.5279	-4.2092
M1/CPI	-2.51462	-3.1949	-3.5279	-4.2092
Δ M1/CPI	-1.8479	-2.6148	-2.9527	-3.6422
MV/GDP	-2.00311	-3.1949	-3.5279	-4.2092
Δ MV/GDP	-1.97871	-2.6148	-2.9527	-3.6422
(New Economy MV Sum) / GDP	-0.06106	-3.2056	-3.5468	-4.2505
Δ [(New Economy MV Sum) / GDP]	-2.05854	-2.6148	-2.9527	-3.6422
(New Economy Volume Sum) / GDP	-2.38204	-3.2056	-3.5468	-4.2505
Δ [(New Economy Volume Sum) / GDP]	-4.0371	-2.6148	-2.9527	-3.6422
(New Economy Volume Sum) / (MV Sum)	-2.28918	-3.2056	-3.5468	-4.2505
Δ [New Economy Volume Sum) / (MV Sum)]	-2.83586	-2.6148	-2.9527	-3.6422
(Old Economy MV Sum) / GDP	-2.03148	-3.2056	-3.5468	-4.2505
Δ [(Old Economy MV Sum) / GDP]	-2.1852	-2.6148	-2.9527	-3.6422
(Old Economy Volume Sum) / GDP	-1.26766	-3.2056	-3.5468	-4.2505
Δ [(Old Economy Volume Sum) / GDP]	-1.64262	-2.6148	-2.9527	-3.6422
(Old Economy Volume Sum) / (MV Sum)	-1.80491	-3.2056	-3.5468	-4.2505
Δ [(Old Economy Volume Sum) / (MV Sum)]	-2.47826	-2.6148	-2.9527	-3.6422
Volume / GDP	-2.03355	-3.1949	-3.5279	-4.2092
Δ (Volume / GDP)	-4.19147	-2.6148	-2.9527	-3.6422
Volume / MV	-1.83741	-3.1949	-3.5279	-4.2092
Δ (Volume / MV)	-2.75511	-2.6148	-2.9527	-3.6422

MacKinnon critical values for rejection of hypothesis of a unit root.

Table 1 reveals that no level variable passes the Augmented Dickey Fuller test—that is they are not stationary. Many of the differenced relationships do pass the ADF test. Visual inspection of the test intimates that most of the differences series appear to move toward stationarity.

III. Results

As discussed earlier, we start our empirical investigation working with level variables to assess long run relationships and then, where appropriate, we work with first differences to assess short run relationships. As we noted above, differencing the data appears to improve the likelihood of stationarity. Although, some series do not pass the statistical tests, the differenced series do not seem to trend in any direction. We do not difference the data further as we are leery of creating spurious relationships through over-differencing.

Throughout the various regressions, price-adjusted money supply , our proxy for bank lending, and to a lesser degree, volume, consistently appeared important. We employ two series to determine the importance of volume and thus liquidity: volume

divided by market value and volume divided by real GDP; the former is the measure that is significant.

Table 2. Total Market

	Dependent Variables	
Independent Variables	Real GDP Levels (t-statistic)	Changes in Real GDP (t-statistic)
Constant	60.40029	-0.014314
	(31.49216)	(-0.095213)
Market Value / GDP	0.000124	-1.02E-05
	(0.581207)	(-0.064949)
Volume / GDP	0.013946	0.016556
	(0.353833)	(0.446308)
Volume / MV	-251.7105	-114.9756
	(-1.199342)	(-0.46113)
M1 / CPI	-7.68E-05	3.00E-05
	(3.718964)	(1.439767)
D1	-0.543716	0.194776
	(-1.300503)	(1.019473)
R^2	0.952073	0.004866
Durbin-Watson stat	1.243535	1.728393
ADF Residual*	-2.730526	

* Critical Values from Halmilton. α = .05 Critical Value: -4.71
α = .10 Critical Value: -4.43

Table 2 presents our estimation of the impact of the complete system of Swiss financial data on economic growth. In this first system, where the level of real GDP is the dependent variable, no cointegration is present. The ADF statistic of the residual does not allow us to reject non-stationarity for Z_t. While standard errors are biased, it may be important to note the high t-statistic for M1 / CPI. Price-adjusted money supply, a proxy for bank lending, strongly exceeds the typical significance indicator of 2. This may intimate that money supply is correlated with real GDP.

In the second system, where all variables have been differenced, nothing appears to be significantly correlated. It is possible that the length of the data sample, spanning only ten years, is too short to capture any meaningful relationships.

Table 3. Old and New Economy Samples

	Dependent Variables	
Independent Variables	Real GDP Levels (t-statistic)	Changes in Real GDP (t-statistic)
Constant	61.2118	-0.975357
	(33.34955)	(-2.044038)
Old -- Market Value / GDP	0.000302	0.00018
	(1.310552)	(0.617906)
Old -- Volume / GDP	0.032819	-0.001639
	(1.903521)	(-0.108307)
Old -- Volume / MV	0.01999	-0.000106
	(0.861014)	(-0.057744)
New -- Market Value / GDP	0.000394	-0.000209
	(1.709861)	(-.785896)
New -- Volume / GDP	-0.000350	0.004369
	(2.193659)	(1.007048)
New -- Volume / MV	0.003900	0.003343
	(2.193659)	(1.781334)
M1 / CPI	5.27E-05	9.23E-06
	(3.108936)	(2.198604)
D1	-0.050105	-0.079623
	(-0.002874)	(-0.358194)
R^2	0.957194	0.295253
Durbin-Watson stat	1.485077	1.989434
ADF Residual*	-3.236311	

* Critical Values from Halmilton. α = .05 Critical Value: -4.71
α = .10 Critical Value: -4.43

[NOTE: Critical values are only available for 5 variables]

In Table 3 we have included data from representative new economy and old economy stocks in order to test whether various economic sectors affect economic growth differently. However, no cointegration is evidenced. In the second system of changes, there is some evidence that one of our measures of new economy stock volume may be important. Likewise, our proxy for bank lending is significant. The results suggest that new economy financial market variables may be more important in determining short run changes in real GDP than old economy variables.

Next we divide our system into separate equations to further test whether the different sectors impact GDP growth. Results from this exercise are reported in Tables 4 and 5. Again, cointegration of the new economy system of variables is rejected. We are, however, able to accept cointegration in the old economy system.

Table 4. New Economy Samples

	Dependent Variables	
Independent Variables	Real GDP Levels (t-statistic)	Changes in Real GDP (t-statistic)
Constant	58.92295	-0.900105
	-58.62716	(-2.254107)
Market Value / GDP	0.000673	1.36E-04
	(3.087335)	(-0.611167)
Volume / GDP	-0.003893	0.003314
	(0.955276)	(0.880727)
Volume / MV	0.00497	0.003227
	(4.150241)	(1.845881)
M1 / CPI	8.13E-05	8.37E-06
	(9.428391)	(2.808221)
R^2	0.956804	0.197571
Durbin-Watson stat	1.377964	1.931687
ADF Residual*	-3.579475	

* Critical Values from Halmilton. α = .05 Critical Value: -4.45
α = .10 Critical Value: -4.16

Table 5. Old Economy Samples

	Dependent Variables	
Independent Variables	Real GDP Levels	Changes in Real GDP
Constant	59.36492	-0.95836
	(35.70442)	(-2.226710)
Market Value / GDP	0.000154	5.65E-05
	(0.678870)	(0.215746)
Volume / GDP	0.054693	0.000678
	(4.575987)	(0.045139)
Volume / MV	0.005454	0.000111
	(5.443079)	(0.061551)
M1 / CPI	6.40E-05	8.65E-06
	(3.936825)	(2.666900)
R^2	0.950151	0.104046
Durbin-Watson stat	1.075643	1.866793
ADF Residual*	-4.484791	

* Critical Values from Halmilton. α = .05 Critical Value: -4.45
α = .10 Critical Value: -4.16

Measures of old economy stocks' volumes and market size, as well as our proxy for bank lending are cointegrated at α = .05, and therefore share a long run relationship. This result is consistent with Levine and Zervos' (1998) conclusions—we see that economic growth does occur along side financial market development. Additionally we see that our old economy stock volume measures have super-consistent coefficients. These coefficients indicate that volume has a greater impact on economic growth than any other variable in our system.

When the differences equations are examined, we see, however, that the proxy for bank lending is significant. In addition, volume / market value is significant in the new economy system.

Perhaps most interesting is the adjusted R-squared value for the old and new economy differences equations. The new economy system captures more of the short run fluctuations in the changes in real GDP, as evidenced by the higher R-squared of 19% (relative to 10% in the old economy system). However, the presence of cointegration in the system of old economy financial variables indicates that the old economy financial sector is an important determinant of long run growth.

IV. Conclusion

In our various systems we found that M1 or money supply, our proxy for bank lending, and volume stand out as variables that seem important in determining economic growth. Both of these variables reflect the amount of liquidity in the economy. If volume increases, one may infer that it is easier for investors to purchase stock or sell it for cash. Additionally bank lending contributes to liquidity, because entrepreneurs should be more able to fulfil their cash needs when banks are making more loans.

The long run relationship between bank lending and GDP growth may be explained by banks' advantages over individual investors. As Bencivenga and Smith (1991) hypothesized, banks have the luxury of operating under the law of averages, so that they can keep less money on reserve than individuals could, and they can better diversify risk. Additionally Atje and Jovanovic (1993) point out that banks have more complete knowledge of potential investments, and so can determine which are the best investments and then fund only them. Banks then serve to minimize the natural adverse selection, whereby asymmetric information causes the least qualified companies to receive funding while the best qualified entrepreneurs do not participate in the markets. Banks are able to pick companies to invest in more efficiently by tracking companies. Monitoring companies allows banks to insure that their investment capital is being handled properly, thus reducing some moral hazard issues and boosting the productivity of the investment dollars.

Bank lending and volume both basically measure the amount of liquidity in the markets. For example, an increase in bank lending, should result in more quality investments receiving needed funds. Likewise, high volumes indicate that stock holders can more easily sell their stock. Bencivenga, Smith and Starr (1995) add that historically

the best and most productive investments have been the long term, riskier ones. Liquid financial markets are important because individuals, with no access to such markets, are less likely to lock their savings into a venture which may or may not succeed and will not provide returns for years to come. But if investors can easily buy and sell stakes in such a venture then more long-term productive projects will receive funding.

One reason that old economy stocks should be cointegrated with long run GDP growth is that these companies have historically developed slowly, requiring deeper, more liquid markets. Before many new economy computer companies so rapidly rose to prominence, it was expected that companies would have to wait significantly longer before they earned strong profits. As Bencivenga, Smith and Starr (1995) note, Old economy companies, which have historically developed much more slowly and may in general have higher start-up costs, require deeper capital markets that will fund the company for a greater period of time. Additionally, as Atje and Jovanovic (1993) note, the slower-developing old economy requires that markets be liquid enough that investors will not fear they will not be able to easily purchase or sell their shares.

Another reason that we found only the old economy system to be cointegrated-and not the new economy-may be due to the particular sectors we chose to represent Switzerland's old and new economy. In particular, one of the three old economy sectors we chose was pharmaceuticals and chemicals. This sector, which includes two of the world's largest pharmaceutical companies, Roche and Novartis, has the highest market value of any sector on the Swiss market. In addition, the market value to real output ratio is much higher than any of the other sectors we considered. Because this sector is so large, it's relationship with economic growth may bias the entire old economy financial market's affect on economic growth.

Lastly, while one might expect the new economy system to be cointegrated, it may be that such a relationship has yet to be established. Because much of the benefit from a strong financial sector stems from banks' information gathering activities, and because many high-tech stock valuations are derived from predicted future profits, there may still be too much uncertainty for banks to provide reliable analysis of company performance. As banks become better able to discern the future of the high-tech sectors,

their assessments may become more effective at selecting successful companies, thus establishing cointegration.

In conclusion, we see that strong liquidity, in the form of bank lending and volume, are important indicators of economic growth. These conclusions are logical and support many economic theories. In the case of Switzerland, the country already has a very developed banking sector, leaders may wish to further increase bank lending by seeking international investors—a group the country tried to exclude in the 1970's. Foreign investors could give the banks more cash to lend to venture capitalists. Additionally, the country should consider ways to increase market volumes. In the past few years, the country has, in fact, invested in a technologically advanced trading system to increase trade efficiency and thus allow higher volumes. In order for Switzerland to continue to benefit from economic growth, the country should look to further improve the technical aspects of the market operations. If the market is able to handle increasingly greater volumes, the evidence suggests the Swiss economy will profit.

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