Risk premia on Swiss government bonds and sectoral stock indexes during international crises

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This paper assesses the sensitivity of excess returns on Swiss government bond and sectoral stock indexes to risk factors during international crisis and non-crisis periods over the sample period from January 1995 to December 2014. The empirical results show that assets that were closely linked to the Swiss economy, such as government bonds or stocks from "non-tradable" sectors, exhibited safe haven characteristics during the Eurozone sovereign debt crisis and in the non-crisis periods. This finding does not pertain to assets closely linked to international economic developments, such as stocks from tradable goods sectors.

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1 Introduction

Conventional wisdom holds that assets denominated in Swiss francs (CHF) and CHF exchange rates exhibit "safe haven" characteristics, i.e. that they tend to gain in value during crisis periods.[2] This paper evaluates the quantitative importance of the perceived safe haven property of CHF-denominated assets in the period from January 1995 to December 2014. It thus complements the historical analysis of Swiss interest rates and Swiss franc exchange rates by Baltensperger and Kugler (2015) in this issue.

Specifically, the paper takes the perspective of a Swiss investor and uses an extension of a simple empirical asset-pricing model proposed by Aboody et al. (2014) to study time variation in excess returns – a proxy of the risk premium – on a Swiss government bond index as well as sectoral Swiss stock indexes during two crisis periods: the global financial crisis from July 2007 to March 2009, and the Eurozone sovereign debt crisis from October 2009 to June 2012.[3]

1 I thank Rahel Suter (discussant) and participants at the Aussenwirtschaft conference on "The safe haven status of the CHF and the Swiss external sector during international crisis" for their comments and suggestions. This paper also benefitted from comments by Katrin Assenmacher, Signe Krogstrup and Mico Loretan. Any errors and omissions are my own. The views expressed in this paper do not necessarily reflect the stance of the Swiss National Bank.

2 See, for example, Kugler and Weder (2005); Hoffmann and Suter (2010), Ranaldo and Söderlind (2010) and Grisse and Nitschka (2015).

3 The now famous "whatever it takes" speech by Mario Draghi (Draghi, 2012) took place on 26 July 2012 and visibly calmed markets such that June 2012 is a natural, though preliminary, endpoint of Eurozone crisis for the purpose of this study.

This time series assessment takes the form of regressions of excess returns on the test assets on contemporaneously measured variables that should be determinants of asset returns (risk factors). Based on ABOODY ET AL. (2014), I interact these variables with three different dummies that indicate the period of the global financial crisis, the period of the Eurozone sovereign debt crisis, and the remainder of the sample period (i.e. "non-crisis" periods). This simple framework allows me to assess potential variability in the sensitivity of the asset returns to risk factors across the three different time periods.

Based on insights from the present value model for asset prices of CAMPBELL and SHILLER (1988), ABOODY ET AL. (2014) study the sensitivities of US corporate bond returns to news about cash flows and news about discount rates of the overall corporate bond market and their relation to government actions during crisis episodes. In contrast to ABOODY ET AL. (2014), who proxy the two news components by changes in earnings and changes in treasury bill rates, I use the vector autoregression approach of CAMPBELL (1991) to disentangle stock market cash flow news from discount rate news in excess returns on the Swiss Performance Index (SPI) to obtain a measure of cash flow and discount rate news that is broadly representative of economic news related to the Swiss economy.[4] In addition to the two stock market news components, this paper assesses the exposure of Swiss asset returns to global uncertainty shocks (i.e. news) as measured by innovations in the logarithmic level of the VIX (CBOE option-implied volatility index of the S&P 500).[5] Studies of the safe haven characteristics of Swiss assets show that this global risk factor is vital to understand CHF exchange rate changes and Swiss bond returns (RANALDO and SÖDERLIND, 2010; NITSCHKA, 2014b; GRISSE and NITSCHKA, 2015).

The assets under study include an index of Swiss government bonds and four indexes covering different sectors of the Swiss stock market: consumer goods, materials, healthcare and financials. The latter two sectors provide services that could be broadly classified as "non-tradables". The consumer goods and materials sectors rather represent "tradable goods" sectors, as argued in HASSAN (2013).

The main results are easily summarized. Excess returns on the Swiss government bond index exhibit relatively low sensitivity to the Swiss stock market's cash flow news and discount rate news during non-crisis periods. The sensitivity to the market's cash flow news increases in the crisis periods. Interestingly, Swiss government bond returns were basically unrelated to innovations in the VIX

4 REY (2004) has used this framework to study the dynamics of Swiss stock market returns. NITSCHKA (2014a) jointly analyses Swiss stock and bond market dynamics.

5 BLOOM (2009) used stock market volatility (VIX) as a measure of uncertainty. REY (2013) argues that VIX is strongly correlated with measures of global financial cycles.

during the global financial crisis. This latter finding could reflect both the Swiss economy's fall into recession and the troubles in the banking sector during this period. Under such circumstances, Swiss government bonds have not been perceived as insurance against the materialisation of risks. However, we observe positive exposure to innovations in the VIX during the Eurozone sovereign debt crisis and in the tranquil periods. Swiss government bonds gained in value when uncertainty increased during these periods. These latter observations are consistent with the view that Swiss government bonds are safe havens in the sense that they provide insurance value against global risks.

Exposures to the VIX innovations differ across the two international crisis periods. This suggests that the fundamental characteristics of these two crises were different, thus supporting the conclusions drawn by Auer and Tille (2015) from their analysis of capital flows to and from the Swiss banking sector during these two crisis periods presented in this issue.

The stock market evidence suggests that Swiss stocks from "tradable goods" sectors such as consumer goods and basic materials were, on average, negatively affected by increasing global uncertainty risk, but particularly so during the crisis periods under study. Moreover, the sensitivities of excess returns on the consumer goods and materials sector indexes to the two varieties of stock market news vary widely across the three different time periods. This finding is potentially related to the evidence presented by Alvero and Fischer (2015) in this issue, who show that international spillover effects of central banks' unconventional policy measures in recent years affected Swiss asset prices (in the case of Alvero and Fischer's study, the option prices of Swiss franc exchange rates).

The observation of time-varying sensitivity to stock market news does not pertain to the healthcare and financials sector indexes; sensitivity here does not vary much across the sub-periods. In addition, excess returns on the healthcare index exhibit the same safe haven characteristics as Swiss government bonds in the sense that they are positively related to increasing global uncertainty.

In sum, this paper shows that an asset being CHF-denominated is not sufficient to make it a safe haven asset. The underlying risks of the assets are more important in this respect. Over the sample period of this study, assets that were closely linked to the Swiss economy, such as government bonds and stocks of the Swiss healthcare sector, exhibited insurance value against global risk as measured by the VIX index. This was not the case for assets that were closely linked to international economic developments, such as stocks from tradable goods sectors.

The remainder of the paper is organized as follows. Section 2 summarizes the theoretical background. The empirical methodology is introduced in Section 3. Section 4 describes the data. Section 5 covers the empirical results and Section 6 concludes.

2 Theoretical background

The basic pricing equation for excess returns, i.e. returns in excess of a short-term debt rate, is the starting point for the subsequent empirical analysis. It says that expected excess returns on any asset i, $r_t^{i,e}$, discounted by the stochastic discount factor, m_t, should be zero.

$$0 = E_t(r_{t+1}^{i,e} m_{t+1}) \tag{1}$$

Typically, we assume linearity of the discount factor and normalize the constant term in the linear specification to unity, such that $m_{t+1} = 1 - f'_{t+1}b$. If we take unconditional expectations and further rearrange, then equation (1) becomes:

$$E(r_t^{i,e}) = \mathrm{cov}(r_t^{i,e} f_t)b \tag{2}$$

in which f_t is a $k \times 1$ vector of risk factors and b denotes the respective vector of factor loadings.

Since this paper uses a regression-based empirical framework, I implicitly work with the following version of equation (2):

$$E(r_t^{i,e}) = \mathrm{cov}(r_t^{i,e} f_t)\Sigma_f^{-1}\Sigma_f b \tag{3}$$

where Σ_f is the variance/covariance matrix of the risk factors and the following definitions $\mathrm{cov}(r_t^{i,e} f_t)\Sigma_f^{-1} = \beta^i$ and $\Sigma_f b = \lambda$ apply, such that equation (3) can be written in more compact notation as:

$$E(r_t^{i,e}) = \beta^i \lambda \tag{4}$$

which says that expected excess returns on asset i are a function of asset i's sensitivity, i.e. the regression coefficient (β^i), to the risk factors and the risk prices of these factors (λ) which are the same for all assets (Cochrane, 2005).

A standard benchmark model is the Sharpe (1964) and Lintner (1965) capital asset pricing model (CAPM) in which the only risk factor is the excess return on the market portfolio. The market portfolio comprises all risky assets. Empirical versions of the CAPM proxy the market portfolio with a broad stock market index such that the only determinant of an asset return should be its sensitivity to the excess return on the market portfolio proxy, i.e.

$$r_t^{i,e} = a^i + m^i r_t^{M,e} + \varepsilon_t^i, \mathrm{t} = 1, \dots T \tag{5}$$

with $r_t^{M,e}$ the excess return on the market portfolio.

However, the CAPM hides more than it reveals about the economic source of risk. The market return reflects a combination of expectations about future dividend/earning streams and the rate at which these cash flows are discounted. It is important to distinguish between these two sources of risk because a decline in expected cash flows has a more persistent effect on the value of the market portfolio than variation in the expected discount rate, which varies over the business cycle (Campbell and Vuolteenaho, 2004).

Starting from the two-period present value model that links current stock prices to dividends and returns, i.e.

$$1 + r_{t+1} = \frac{P_{t+1} + D_{t+1}}{P_t} \quad ,$$

Campbell (1991) shows that the unexpected market return can be decomposed into revisions in expectations of future dividend growth (cash flow news) and revisions in expectations of future discount rates (discount rate news):

$$r_{t+1} - E_t r_{t+1} = (E_{t+1} - E_t)\sum_{j=0}^{\infty} \rho^j \Delta d_{t+1+j} - (E_{t+1} - E_t)\sum_{j=0}^{\infty} \rho^j r_{t+1+j} \tag{6}$$

This insight and an intertemporal version of the CAPM (Campbell, 1993) is used by Campbell and Vuolteenaho (2004) to propose a modified version of the CAPM in the form of

$$r_t^{e,i} = a^i + \beta_1^i NCF_t + \beta_2^i NDR_t + \varepsilon_t^i, t = 1, \dots T \tag{7}$$

with

$NCF \equiv (E_{t+1} - E_t)\sum_{j=0}^{\infty} \rho^j \Delta d_{t+1+j}$ denoting cash flow news, and

$NDR \equiv (E_{t+1} - E_t)\sum_{j=1}^{\infty} \rho^j r_{t+1+j}$ denoting discount rate news.

This framework forms the basis of this paper's empirical analysis of Swiss asset returns in international crisis periods. It allows the two sources of economic risk that underlie variation in the market return to be distinguished.

3 Data, sample period and descriptive statistics

The sample period of this study is limited by the availability of sectoral stock indexes, and covers the period from January 1995 to December 2014. All of the data are measured at the monthly frequency. In order to obtain excess returns, I subtract the one-month CHF Libor, obtained via Datastream, from returns on the Swiss government bond index and Swiss sectoral stock indexes denominated in local currency.

The Swiss government bond index is from the SIX Swiss Exchange and takes coupon payments into account (total return index). It comprises all publicly traded Swiss government bonds of all maturities. The sectoral stock indexes are from MSCI and obtained via Datastream. I use indexes of four different sectors: consumer goods, materials, healthcare and financials. Consumer goods and materials can be broadly classified as tradable goods sectors, while the other two sectors primarily offer services and can thus be classified as non-tradable sectors (Hassan, 2013).

Table 1 gives an overview of the average excess returns on these assets, their standard deviations and the Sharpe ratio (mean return divided by standard deviation) over the different periods under study. We see strong differences across assets and across periods of time. Swiss government bonds offered positive excess returns (almost 5% p.a.) during the global financial crisis, which stands in marked contrast to all of the Swiss stock sector returns which experienced excess returns from -20 % p.a. to -74% p.a. The sovereign debt crisis provides a mixed picture, while stock sector indexes clearly outperformed the Swiss government bond index in the "non-crisis" periods of the sample. The subsequent empirical analysis aims to shed light on the economic risks underlying these differences in excess returns across assets and across time periods.

Motivated by the literature on the safe haven characteristics of Swiss franc exchange rates, this study uses the CBOE option-implied volatility index of the S&P 500 index (VIX) as an empirical measure of global uncertainty (Bloom, 2009; Rey, 2013) and innovations in this variable as an additional explanatory variable in the empirical analysis.

Table 1: Descriptive statistics of dependent variables

		Government bond	Materials	Consumer goods	Health care	Financials
Mean (% p.a.)	GFC	4.80	-32.02	-50.79	-21.35	-74.08
	SDC	5.24	5.79	19.40	2.86	-14.18
	Non-crisis	2.91	15.52	13.84	13.03	15.58
Standard deviation (% p.a.)	GFC	16.13	59.73	125.21	59.30	98.44
	SDC	12.09	62.72	86.92	46.90	79.64
	Non-crisis	12.15	68.97	86.22	50.83	93.53
Sharpe Ratio	GFC	0.30	-0.54	-0.41	-0.36	-0.75
	SDC	0.43	0.09	0.22	0.06	-0.18
	Non-crisis	0.24	0.23	0.16	0.26	0.17

Notes*:* This table presents mean returns, standard deviations and the Sharpe ratios of all assets returns that are the dependent variables in this study. The table distinguishes between descriptive statistics during the two international crises (“GFC”: global financial crisis; “SDC”: sovereign debt crisis in the Eurozone) and the other months of the sample (“Non-crisis”).

Furthermore, I use the term yield spread, i.e. the difference between a ten-year Swiss government bond yield and the one-month CHF Libor, and the aggregate dividend-price ratio in the VAR estimation to back out discount rate and cash flow news components. The source of constant maturity ten-year government bond yields for Switzerland is the Swiss National Bank (SNB). The monthly log dividend-price ratio is obtained as the log of the sum of monthly dividends over the past year minus the log of this month’s Swiss stock price index. Monthly dividends are obtained as the difference between the return on the total return index (including dividend payments) in $t+1$ minus the return on the price index (excluding dividend payments) in $t+1$ times the stock price index in t. Annual dividends are the sum of the monthly dividends.

4 Empirical framework

4.1 Calculating the cash flow and discount rate news components

The VAR setup follows Campbell (1991). The VAR system features a state vector that contains the Swiss stock market excess return as its first element and variables that are potential predictors of the market return as other elements. I use one lag in the estimation, as suggested by standard information criteria.

Let z denote the state vector, then the VAR is represented by:

$$z_{t+1} = \Gamma z_t + u_{t+1} \tag{8}$$

in which Γ is the matrix of VAR coefficients and u denotes the error terms. Further define the 4 x 1 vector *e1* in which the first element is one and all other elements are zero. Discount rate news can be computed directly from the VAR estimates, as the stock market return is the first element of the state vector, i.e. $NDR_{t+1} = e1'\lambda u_{t+1}$ with $\lambda = \rho\Gamma(I - \rho\Gamma)^{-1}$. Cash flow news is the residual, $NCF_{t+1} = (e1'+e1'\lambda)u_{t+1}$.

4.2 Assessing asset returns during international crises

The empirical framework to assess asset returns during international crises is based on that of Aboody et al. (2014), who analyze US corporate bond returns. The basic idea is that asset returns should be related to measures of news about corporate cash flows in the economy (here, *NCF*) and news about the rate at which expected cash flows from holding assets are discounted (here, *NDR*). The previous section highlighted how to obtain such measures from stock market data. In addition, I include a proxy of global uncertainty news in the empirical setup to take into account that investors might value assets differently in times of rising or falling uncertainty. Recent evidence on the safe haven characteristics of Swiss franc exchange rates and Swiss franc-denominated bond returns suggests that controlling for uncertainty (as measured by the VIX index) is vital to understand Swiss asset returns (Ranaldo and Söderlind, 2010; Nitschka, 2014b, Grisse and Nitschka, 2015). I assume that the (logarithmic) VIX level follows an AR(1)[6] process and use innovations to the VIX level as a proxy of news about global uncertainty, henceforth abbreviated as *NVIX*.

6 The empirical results do not change if I allow for higher orders of the autoregressive process. These results are not reported here, but are available upon request.

These three variables are interacted with a total of three dummies to assess the sensitivity of CHF-denominated asset returns during crisis periods. The first dummy takes a value of one in all months of the global financial crisis (from July 2007 to March 2009), and zero otherwise.[7] The second dummy takes a value of one in all months of the Eurozone sovereign debt crisis (from October 2009 to June 2012), and zero otherwise.[8] The third dummy takes a value of one during all months that are not defined as being in one of the two crisis periods, and zero otherwise, to isolate the relationships between Swiss asset returns and news about cash flows, the discount rate and a measure of uncertainty in "normal" times. The regression equation then becomes:

$$r_t^{e,i} = \alpha^i + \beta_1^j(NCF_t D_t^j) + \beta_2^j(NDR_t D_t^j) + \beta_3^j(NVIX_t D_t^j) + \varepsilon_t^i \qquad (9)$$

in which r^e denotes the log excess return on asset i, D represents one of the $j = 3$ dummies described above, *NCF* indicates news about cash flows, *NDR* indicates news about discount rates, and *NVIX* is the innovation to the CBOE option-implied volatility index on the S&P 500 index.

Notice that in this multifactor asset-pricing model, the regression coefficients measure the marginal exposure to the respective risk factor, i.e. the sensitivity to a risk factor in the presence of other factors. This setup leads to different estimates of the sensitivity to cash flow and discount rate news from those in Campbell and Vuolteenaho (2004). They define the sensitivity to the two news components of the market return in such a way that it adds up to the total market return sensitivity. This approach is potentially problematic if the news components are significantly correlated with each other.

7 This timing of the global financial crisis follows Ait-Sahalia et al. (2012).

8 I base the start of the Eurozone sovereign debt crisis on Ehrmann et al. (2014) and take the preliminary endpoint of this crisis to be the month before the July 2012 speech by Mario Draghi (see footnote 3 above).

5 Empirical results

5.1 VAR estimates

In the context of this paper, the state vector consists of the stock market excess return (*rx*), the dividend-price ratio (*dp*), the spread between a long-term government bond yield and the one-month CHF Libor (*ys*), and the one-month CHF Libor rate minus its one-year backward moving average (*rshort*) as a measure of unusually high or low short-term interest rates (CAMPBELL, 1991).

Table 2 gives an overview of the VAR estimation results. Apart from its own lagged values, the yield spread and the dividend-price ratio predict the Swiss stock market excess return significantly one month ahead. The measure of fit, R^2, is about 5%, which is reasonable at a time horizon of one month and a bit higher than reported, for example, in NITSCHKA (2014a) for a longer sample period. The other VAR estimates are standard with the exception of the significant impact of lagged stock market excess returns on the term yield spread.

Table 2: VAR estimates

	rx_{t-1}	dp_{t-1}	ys_{t-1}	$rshort_{t-1}$	R^2
rx_t	0.16** (2.50)	0.02* (1.81)	0.01** (2.67)	10.66 (1.42	0.05
dp_t	-0.06 (-0.46)	0.96** (51.45)	-0.02* (-1.66)	2.31 (0.14)	0.94
ys_t	-0.80** (-2.11)	-0.07 (-1.31)	0.89** (28.55)	-96.35** (-2.16)	0.87
$rshort_t$	0.00** (2.24)	0.00 (1.35)	0.00** (3.79)	0.96** (29.22)	0.82

Notes: This table presents estimates from a vector autoregression (VAR) with lag length of one month of the following variables: the excess return on the Swiss stock market (*rx*), the log dividend-price ratio (*dp*), the spread between yields on long-term bonds and a short-rate (yield spread, *ys*), and the short-rate relative to a one-year moving average (relative short-rate, *rshort*). The sample period starts in January 1995 and ends in December 2014. Newey-West corrected t-statistics appear below the estimates in parenthesis (NEWEY and WEST, 1987). The measure of fit, R^2, is corrected for the number of regressors. ** and * denote significance at the 95% and 90% confidence level.

5.2 Swiss government bond returns during international crises

The descriptive statistics presented in Table 1 give the impression that Swiss government bonds provided a good hedge against the risks that materialized during the two international crisis periods under study. The Swiss government bond index offered positive excess returns during the international crises. In addition, these excess returns were higher during the crisis periods than during the "non-crisis" subsample. This section assesses whether we can attribute these findings to differences in the sensitivity to the three risk factors (the news proxies) under study.

The estimates from equation (9) for Swiss government bond excess returns as a dependent variable are presented in Table 3. I distinguish between sensitivity to the Swiss market's cash flow news, discount rate news and VIX news, additionally differentiated between the two international crisis episodes and the remainder of the sample period (i.e. the "non-crisis" period).

These estimates show that the sensitivity of Swiss government bond returns to the two news components obtained from stock market data is relatively small on average. The sensitivity to cash flow news is higher in absolute values during the two international crisis periods. For example, during the sovereign debt crisis in the Eurozone, Swiss government bond excess returns reacted more negatively to cash flow news than in normal times. A potential explanation for this finding is the massive appreciation of Swiss franc exchange rates during this period, which had an adverse impact on economic prospects and led to negative inflation surprises. Since bonds are nominal assets, their value increases when inflation is surprisingly low.

The estimates presented in Table 3 further show that there is positive exposure of Swiss government bond returns to innovations in the VIX index, the proxy for uncertainty shocks, during the Eurozone sovereign debt crisis. This significant and positive regression estimate suggests that the Swiss government bond index offered positive excess returns when uncertainty was high. It thus provided a safe haven during this period. Albeit smaller in magnitude, but still statistically significant, we observe a similar positive association between VIX innovations and excess returns on the Swiss government bond index during the non-crisis periods of the sample. By contrast, there is no significant link between the two during the global financial crisis. This observation could reflect the fact that Switzerland hosts two big internationally active banks that were affected by the stress in the financial system during the global financial crisis. The possibility of bank bailouts by the federal government (and hence taxpayers, who ultimately back government bonds) might explain why Swiss government bonds were not considered as insurance against the materialisation of global risks during this period.

In sum, these results suggest that exposure to the three risk factors does not explain the positive excess returns on Swiss government bonds during the global financial crisis. None of the regression estimates is significantly different from zero. The evidence from the sovereign debt crisis, however, suggests that Swiss government bonds exhibited safe haven characteristics. They gained in value when uncertainty was high.

Table 3: Swiss government bond excess returns during international crises

β^1 (cash flow news)	GFC	-0.04 (0.05)
	SDC	-0.14** (0.03)
	Non-crisis	-0.02 (0.02)
β^2 (discount rate news)	GFC	0.10 (0.06)
	SDC	0.01 (0.05)
	Non-crisis	0.08** (0.03)
β^3 * 100 (VIX innovation)	GFC	0.36 (0.58)
	SDC	1.79** (0.64)
	Non-crisis	1.01** (0.47)
R^2 (adjusted)		0.16
Durbin-Watson		1.79

Notes: This table presents the sensitivity of excess returns on the Swiss government bond index to news about the aggregate stock market's cash flows and discount rate as well as the innovation in the logarithmic level of VIX, the CBOE option-implied volatility index of the S&P 500 index, as a proxy of global uncertainty. Furthermore, the table distinguishes this sensitivity across the two international crises ("GFC": global financial crisis; "SDC": sovereign debt crisis in the Eurozone) and the other months of the sample ("Non-crisis"). Newey-West corrected standard errors are in parenthesis below the point estimates (Newey and West, 1987). * and ** indicate significance of the estimates at the 90% and 95% confidence levels. The measure of fit, R^2, is adjusted for the number of regressors. The Durbin-Watson statistic (Durbin and Watson, 1951) is a test of autocorrelation of the regression residuals where a value of 2 indicates no autocorrelation.

5.3 Sectoral stock returns during international crises: Tradables versus non-tradables

This section evaluates whether not only government bonds (debt instruments) but also stocks (residual claims) of Swiss firms exhibit safe haven properties. With this in mind, I run the regressions from equation (9) for excess returns on Swiss sectoral stock index returns as dependent variables. These industry sectors can be broadly classified into "tradables" and "non-tradables" producing firms. Table 4 summarizes the regression results.

Focusing first on the "tradable" sectors such as materials and consumer goods, we observe strong variation in the sensitivity of excess returns on these stock sector indexes to the two market news components across the two international crises and the non-crisis periods. Risk premia (excess returns) on the materials sector's stock index reacted only weakly to cash flow and discount rate news during the global financial crisis. This finding could be driven by construction companies in the materials sector index, which was basically unaffected by the global financial crisis. The picture is different for the consumer goods sector. Excess returns on this sector's stock index reacted more sensitively to market news (regarding both cash flows and discount rates) in the global financial crisis periods than in the other periods. This reflects the strong cyclicality of consumer goods. Moreover, what is common to the two "tradable" sectors is the significant negative exposure to VIX in all of the subsample periods.

Focusing on the "non-tradable" sectors – healthcare and financial services – we observe relatively stable sensitivities to the risk factors across the two crises and the non-crisis periods. This finding is natural given that "non-tradable" sectors should, by definition, be less affected by international crises than "tradable" goods producers. Clearly, the financial sector was affected by the two crisis episodes under study. Against this backdrop, it is not surprising that the excess returns on the financial sector stock index were significantly negatively linked to uncertainty news during the Eurozone sovereign debt crisis period. By contrast, stocks from the healthcare sector exhibited positive exposures to uncertainty shocks across all of the three subperiods of the sample. Hence, they exhibited a similar degree of safe haven characteristics as Swiss government bonds.

Table 4: Excess returns on Swiss stock market sectors during international crises

		"Tradables"		"Non-tradables"	
		Materials	Consumer goods	Health Care	Financials
β^1 (cash flow news)	GFC	0.10 (0.23)	1.42** (0.27)	0.91** (0.22)	1.77** (0.14)
	SDC	0.82** (0.24)	-0.31 (0.22)	0.96** (0.19)	1.30** (0.25)
	Non-crisis	0.94** (0.08)	0.82** (0.13)	0.81** (0.08)	1.48** (0.15)
β^2 (discount rate news)	GFC	0.18 (0.23)	1.28** (0.27)	1.05** (0.30)	1.74** (0.36)
	SDC	0.55** (0.21)	-0.28 (0.29)	1.14** (0.24)	1.27** (0.26)
	Non-crisis	1.02** (0.11)	0.56** (0.20)	0.74** (0.11)	1.48** (0.19)
β^3 (VIX innovation)	GFC	-0.17** (0.04)	-0.14** (0.07)	0.07** (0.03)	0.00 (0.05)
	SDC	-0.08 (0.05)	-0.24** (0.07)	0.06 (0.04)	-0.08* (0.05)
	Non-crisis	-0.03 (0.02)	-0.13** (0.03)	0.04** (0.01)	-0.02 (0.02)
R^2		0.57	0.49	0.55	0.72
Durbin-Watson		2.00	1.80	1.78	2.01

Notes: This table presents the sensitivity of excess returns on four sectors of the Swiss stock market to news about the aggregate stock market's cash flows and discount rate as well as the innovation in the logarithmic level of VIX, the CBOE option-implied volatility index of the S&P 500 index, as a proxy of global uncertainty. Furthermore, the table distinguishes this sensitivity across the two international crises ("GFC": global financial crisis; "SDC": sovereign debt crisis in the Eurozone) and the other months of the sample ("Non-crisis"). Newey-West corrected standard errors are in parenthesis below the point estimates (NEWEY and WEST, 1987). * and ** indicate significance of the estimates at the 90% and 95% confidence levels. The measure of fit, R^2, is adjusted for the number of regressors. The Durbin-Watson statistic (DURBIN and WATSON, 1951) is a test of autocorrelation of the regression residuals where a value of 2 indicates no autocorrelation.

6 Conclusions

This paper has assessed whether the sensitivity of excess returns on Swiss government bonds and sectoral stock indexes to risk factors varied across two international crisis periods and relatively tranquil periods over the sample period from January 1995 to December 2014. In addition, the empirical analysis of the paper has shed light on the question of whether the denomination of an asset in Swiss francs is sufficient for it to qualify as a safe haven asset. Taken together, the main results reported in this paper suggest that the underlying risks of the assets under study appear to be more important than their CHF denomination when determining their riskiness.

Over the sample period of this study, assets that were closely linked to the Swiss economy, such as government bonds and stocks of the Swiss healthcare sector, exhibited insurance value against global uncertainty. This was not the case for assets that were closely linked to international economic developments, such as stocks from sectors that produce "tradable" goods.

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