January 2014

Output Gap As A Predictor Of Risk-Premium In The North American Financial Markets

Ryan Richard Wolbeck

OUTPUT GAP AS A PREDICTOR OF RISK-PREMIUM IN THE NORTH AMERICAN FINANCIAL MARKETS

By

Ryan Richard Wolbeck

Bachelor of Arts, University of North Dakota, 2013

A Thesis

Submitted to the

Graduate Faculty

for the

University of North Dakota.

In Order to Partially Fulfill

the Requirements of

Masters of Science in Applied Economics

Grand Forks, North Dakota

December

2014

This thesis, submitted by Ryan Wolbeck in partial fulfillment of the requirements for the Degree of Master of Science in Applied Economics from the University of North Dakota, has been read by the Faculty Advisory Committee under whom the work has been done and is hereby approved.

Dr. Prodosh Simlai, Chairperson

Dr. Daniel Biederman

Dr. David Flynn

This thesis is being submitted by the appointed advisory committee as having met all of the requirements of the School of Graduate Studies at the University of North Dakota and is hereby approved.

Dr. Wayne Swisher

Dean, School of Graduate Studies

December 8, 2014

Date

PERMISSION

Title: Output Gap as a Predictor of Risk-Premium in North American Financial Markets

Department: Applied Economics

Degree: Master of Science in Applied Economics

In presenting this thesis in partial fulfillment of the requirements for a graduate degree from the University of North Dakota, I agree that the library of this University shall make it freely available for inspection. I further agree that permission for extensive copying for scholarly purposes may be granted by the professor who supervised my thesis work or, in their absence, by the chairperson of the department or the dean of the School of Graduate Studies. It is understood that any copying or publication or other use of this dissertation or part thereof for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and to the University of North Dakota in any scholarly use which may be made of any material in my thesis

Ryan Wolbeck

December 5th, 2014

TABLE OF CONTENTS

LIST OF FIGURES

Figure Page

LIST OF TABLES

Table Page

ACKNOWLEDGMENTS

I would like to thank all of my professors throughout this program, in particular I would like to thank Dr. Prodosh Simlai. Your support and insight in the process of my research was invaluable and I appreciate your time and effort. I would also like to thank Dr. David Flynn and Dr. Daniel Biederman for instruction throughout the program and for being a part of my committee. Finally I would like to thank my wife and my family, your support and encouragement throughout my entire academic career made it possible for me to be where I am today.

ABSTRACT

I examine the relationship between output gap and value premiums in North American financial markets between January, 1977 and December, 2013. My analysis contributes to the literature by analyzing the influence of output gap on the specific investment strategy of value and growth stocks, whereas previous literature looked at the effect of output gap on major US stock market indices. I compare the influence of output gap on value and growth stocks in full period as well as in up and down markets. My results suggest that value and growth stocks are not sensitive to output gap in the full period; but when I partition the market the output gap captures an asymmetric measure of risk for the spread in returns between value and growth stocks.

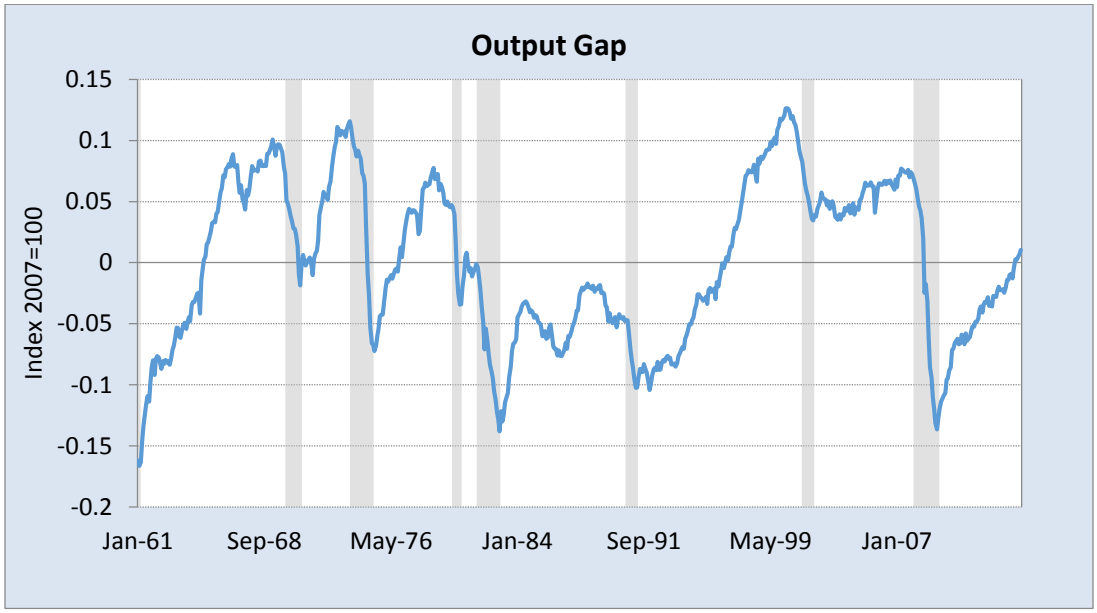
CHAPTER I

INTRODUCTION

The Capital Asset Pricing Model (CAPM) is commonly used by academics and practitioners to describe the relationship between risk and expected return in the pricing of risky securities. The security market line (SML) version of the CAPM suggests the use of market beta as the only proxy for risk. In the regression framework the intercept form the market model version of the SML is known as the abnormal return, which is incremental of the market risk. Even though the market beta is generally accepted a measure of risk, there exists several instances of anomalous behavior in security returns that goes against the prediction of the SML version of the CAPM. The size and the value premiums are two such anomalies. The size anomaly suggests that the firms with small market capitalization earn higher returns than the firms with large market capitalization even after adjusting for market risk (Banz (1981)). The value anomaly suggests that the portfolios of stocks with high book-to-market ratio outperform the portfolio of stocks with low book-to-market ratios on a risk adjusted basis (Fama and French (1993)). For both size and value anomalies there is a risk premium that does not follow the prediction of the SML version of the CAPM. Even though the magnitude of the size premium has gone down in recent years, the extent of the value premium is still present in the United States and several other global markets (Fama and French (2014),Asness et al.(2013)).

The main objective of this paper is to reexamine value premium- the spread in returns between value and growth stocks- in United States and Canadian financial markets by using an important aggregate measure called output gap- the difference between the potential that an economy can achieve and the actual level of industrial production observed. We evaluate the influence of output gap on United States and Canadian value premiums in the full market, as well as in the segmented market. Our empirical results suggest that the role of output gap in predicting the value premium is limited in the full market. However, when we control for up and down markets, we find that there is considerable predictive power in output gap for explaining the time-series variability of value premium.

Figure 1. Output Gap between Jan, 1961 and Dec, 2013



In Figure 1, I provide a time-series plot of the output gap, which suggests that the output gap measure reacts to different economic climates. In the figure, the shaded regions are periods of

recessions identified by the National Bureau of Economic Research (NBER)[1]. The value of output gap declines dramatically during the periods of economic distress such as each recession.

In Figure 2 and 3, I plot the Canadian and United States value premium respectively over the sample period, we can see that the value premium is higher during periods of economic recession therefore value stocks are a good hedge against bad times. This value premium moves in a countercyclical fashion, whereas output gap moves in a pro-cyclical manner. This defined behavior during different economic scenarios provides good preliminary evidence for the predictability of the value premium through the utilization of output gap.

The purpose of this research is to determine whether output gap is a factor that predicts the time-series variability of the value premium. More specifically, this research will look at the downside risk of the value premium in the North American financial markets through the lenses of aggregate economic conditions. This analysis will additionally provide evidence regarding the interplay between non-systematic risk in the Canadian and United States financial markets.

[1] I obtain the NBER definition of recession from www.nber.org.

Figure 2: Canadian Value Premium between Jan, 1977 and Dec, 2013

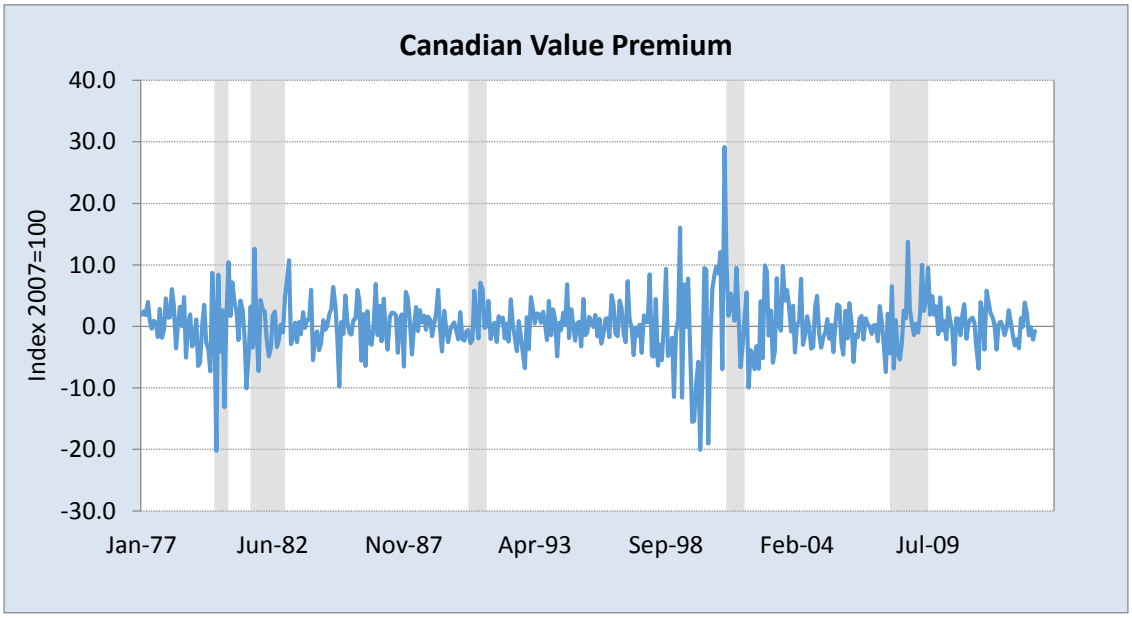
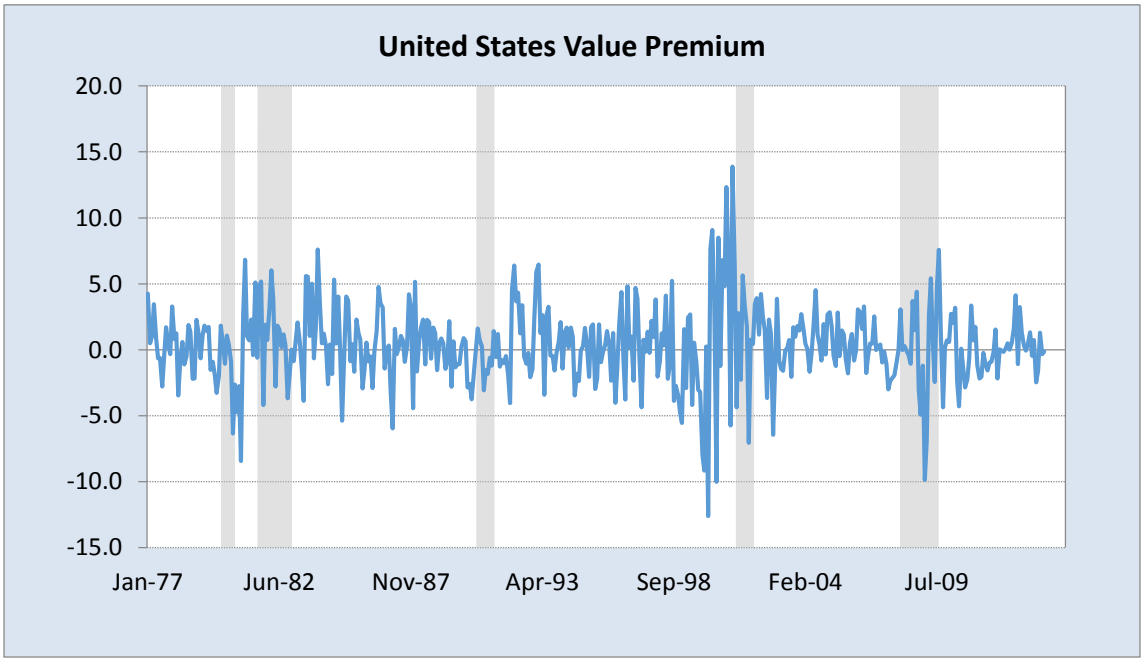


Figure 3: U.S. value premium between Jan, 1977 and Dec, 2013



CHAPTER II

LITERATURE REVIEW

In the literature, a large amount of works have shown that the gap between value stocks (high book-to-market stocks) and growth stocks (low book-to-market) is noteworthy in both the United States stock market as well as global markets (Asness et al. (2012)). Additionally, it is known that the value premium is counter-cyclical and exhibits a higher spread during times of economic downturn and a lower spread during economic expansion (Petkova and Zhang (2005)).

Even though the persistence of excess return on value stocks is well known, the explanation for the value premium varies in the literature. The first common explanation for the value premium is the behavioral argument. Many investors are considered poor Bayesian decision makers and thus "overreact", meaning they place too much value on recent information about a security and pay little attention to the accounting fundamentals. Due to this process of investors overreacting to recent information, stock prices deviate from their fundamental base values (De Bondt and Thaler (1987)). An example of this phenomenon is that naive investors may overreact to stocks that perform badly and oversell them, which in turn allows contrarian investors to bet against this overselling of securities (Lakonishok et al. (1994)). The alternative explanation for the existence of the value premium is based on risk-based arguments. Value stocks may be riskier because they are usually firms that are experiencing hardship during distressed economic times. These companies may face large uncertainty about future earnings

or have high financial leverages that may make them not attractive to naive investors. Chen and Zhang (1998) show that these negative risks have similar explanatory power as book-to-market at explaining differences in cross-sectional returns of value and growth stocks. The value premium has also been linked to macroeconomic factors such as GDP growth. Combined with business cycle indictors, the value premium contains significant information about future GDP growth (Liew and Vassalow (2000)). Fama and French (1993) conclude that there are two common risk factors, which are based on size and value premium, these factors are state variables that predict future changes in investment opportunity in the intertemporal CAPM framework of Merton (1973). This connection with macroeconomic factors supports the idea that the value and growth stocks have dimensions of risk not necessarily captured by the SML version of the CAPM.

Output gap is a macroeconomic production based variable that measures the difference between the natural level of output that would prevail had the economy been working at its potential level of employment and capacity, and the observed level of industrial production. Output gap rises when the economy is expanding, this is due to the level of output in the economy being higher than the potential level. The opposite is also true during contractionary times when the output level tends to move below the potential production level and the output gap becomes negative. These movements, which are depicted in Figure 1, contain valuable information about the economy's direction and current state, and are therefore useful as prime business-cycle indicators. Fama and French (1989) and Cochrane (2006) show the expected return on the common stocks and long term bonds are pro-cyclical (i.e. up in high markets, down in low markets). The same authors also pointed out that the associated expected risk premium on

stocks move in a countercyclical fashion. For this reason we conjecture that output gap could prove to be a valuable predictor of risk premium associated with specific firm level characteristics such as market equity and book-to-market.

The pro-cyclical movement in output gap in conjunction with the countercyclical movement of risk premium should provide additional information about the time-varying nature of the expected risk premium. One of the key attributes of output gap is that it does not contain the level of asset prices, which implies that the expected value is not due to some artificial trend in asset prices and better reflects real movements within the economy (Cochrane (2006)). This eliminates the problem with common financial ratios like book to market, which do include the level of asset prices (Kothari and Shanken (1997)). As stated by Cooper and Priestley (2009), a variable independent of consumption as well as the level of asset price constitutes a suitable predictor for time variation in asset returns over the business cycle. A common concern with output gap however is that fact that it is an estimation, and is not observable. It is then subject to estimation error and different methodology for estimating output gap exists in the literature.

Due to the unobservable nature of output gap, an estimation procedure must be in place. One common estimation used for this analysis is a method developed by Cooper and Priestly (2009). Output gap is estimated as deviations in the log of industrial production, including a quadratic time component. This quadratic trend is a potential level of output estimated over the simple linear trend. The expected value of output gap is zero, due to the actual level of output oscillating around the potential level of output. Let π_t be the log of total of industrial production at time t, t is the deterministic time trend, and v_t is the zero mean disturbance term. Then the estimate of output gap is given by

$$Gap_t = \pi_t - \hat{\delta} - \hat{\gamma_1}\, t - \hat{\gamma_2}\, t^2 \qquad (1)$$

where $\hat{\delta},\ \hat{\gamma}_1\ and\ \hat{\gamma}_2$ are the estimated regression coefficients from equation (2)

$$\pi_t = \delta + \gamma_1 t + \gamma_2 t^2 + v_t \qquad (2)$$

The benefit of using this estimation procedure is that both the quadratic trend and the simple linear trend provide a more accurate assessment of the volatility in output gap. Typically industrial production (IP) doesn't follow a simple linear trend, so this framework (i.e. equations (1) and (2)) by Cooper and Priestly (2009) assists in capturing the non-linear nature of IP more effectively.

CHAPTER III

DATA ANALYSIS AND METHODOLOGY

The primary source of data used for this analysis is from Kenneth R. French's website[2], the original source of the data is the Center for Research in Security Prices (CRSP). Our dependent variables are monthly return of the value-weighted portfolios formed on size and book-to-market. The high book-to-market (value) portfolios contain firms in the top 30% of the ratio and the low book-to-market (growth) portfolios contain firms in the bottom 30%. The HML (high minus low) represents the long-short hedge portfolio. These portfolio returns are used as dependent variables in a regression of output gap, and this process will be used to determine the correlation of output gap to the associated risk premiums. Utilizing data from both the United States and Canada allows for additional analysis of the interplay between the United States and Canadian macroeconomic factors and risk in financial markets. Output gap for the United States will be used to predict risk-premium in the Canadian Market and vice-versa, this will allow us to see how aggregate risk in one country impacts return in the other country.

Data was also collected from the St. Louis Federal Reserve website[3], which publishes monthly United States and Canadian Industrial production estimate that is essential in the estimation of output gap. The time frame used in my evaluation is from January 1977 to December 2013. The data span is reasonable for making current interpretations about risk-premium and covers

[2] Kenneth R. French (2014) http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html
[3] St. Louis Federal Reserve (2014) http://research.stlouisfed.org/fred2/series/INDPRO/

enough variation is the financial markets so that I look at both periods of expansion as well as major economic downturn such as in 2008. Additionally, with the inclusion of Canadian data, I look at the differences in severity of economic downturn between the United States and Canada to draw conclusions about how risk-premium behave in both markets.

The following equation (3) is the preliminary regression being used:

$$R_{i,t} = \beta_0 + \beta_1 * (Gap_t) + \varepsilon_t \quad (3)$$

where the dependent variable $R_{i,t}$ is the monthly return on each asset class, which include value, growth and the HML portfolios, at time t. Our explanatory variables are either Canadian or United States output gap estimated from equations (1), and ε_t is the error term. Due to the importance of the difference in up and down markets, I revise equation (3) as:

$$R_{i,t} = \beta_0 + \beta_1(Upmkt * Gap) + \beta_2\big((1 - Upmkt) * Gap\big) + \varepsilon_t \quad (4)$$

In specification (4), the regression model is modified to disentangle the influence of output gap in up and down markets. This process is done by generating a dummy variable called Upmkt, which takes a value of one when the monthly average value-weighted market return is positive, and zero otherwise. This dummy variable is then multiplied by each country's Output Gap for the analysis. This separation of output gap over up and down markets allows for isolation of how output gap effects the returns of value and growth portfolios and the underlying value premium in times of both economic expansion and contraction.

Table 1. Summary Statistics between Jan 1977 and Dec 2013

Variable	Obs	Mean	Std. Dev.	Min	Max	Sharpe's Ratio
Dependent Variables						
Low Canada	444	0.8284	6.6301	-29.13	23.78	0.1249
High Canada	444	1.0904	6.1089	-26.3	23.36	0.1784
HML Canada	444	0.2619	4.7458	-20.21	29.18	0.0551
Low USA	444	0.9994	5.4921	-27.76	14.695	0.1819
High USA	444	1.3055	4.7458	-23.555	17.195	0.2751
HML USA	444	0.3061	2.9745	-12.61	13.885	0.1029
Independent Variables						
USA Gap	444	-0.0066	0.0642	-0.1380	0.1266	-0.1032
Canada Gap	444	-0.0091	0.0690	-0.1847	0.1376	-0.1318
USA Gap Up	444	-0.0031	0.0514	-0.1380	0.1257	-0.0601
USA Gap Down	444	-0.0035	0.0388	-0.1365	0.1266	-0.0913
Canada Gap Up	444	-0.0047	0.0552	-0.1847	0.1376	-0.0848
Canada Gap Down	444	-0.0044	0.0420	-0.1633	0.1362	-0.1053
Market	444	1.0123	5.6705	-26.73	22.02	0.1785

In Table 1, I provide summary statistics of all of my dependent and independent variables over the time period of January 1977 to December of 2013. Both in Canada and in the United States the returns of low and high book-to-market portfolios have higher standard deviations than the value premium, this is symmetric between both the United States and Canada. Output gap has very small variation across both countries, meaning the estimated value is centered closely along the mean. We can also see that that mean returns on the high book-to-market (value) portfolio is higher than low book-to-market (growth) portfolio, which implies that there exists a positive spread of the value premium. Compared to Canada, the average value premium is larger in the United States and its standard deviation is lower, this is also reflected by examining the spread of the return (i.e. max – min). In the last column, I display the association between return and

risk for different portfolios. A higher Sharpe's ratio indicates that we receive additional return for each unit of associated risk. The Sharpe's ratio for the value premium in the United States is approximately twice that of Canada.

In Table 2, I report the correlation between the value-weighted average market return, the six portfolio returns, and the output gap in the United States and Canada. Here Mkt is the return of the CRSP's value-weighted index of all NYSE, Amex, and NASDAQ stocks.

Table 2: Correlations

			Canada			United States				
		Mkt	**High**	**Low**	**HML**	**High**	**Low**	**HML**	**USA Gap**	**CA Gap**
	Mkt	1								
Canada	**High**	0.8689	1							
	Low	0.9459	0.725	1						
	HML	-0.2029	0.274	-0.46	1					
USA	**High**	0.7253	0.72	0.621	0.06	1				
	Low	0.7362	0.667	0.684	-0.1	0.84	1			
	HML	-0.202	-0.08	-0.27	0.27	0.04	-0.5	1		
	USA Gap	0.0022	-0.04	0.025	-0.09	-0.08	-0.08	0.01	1	
	CA Gap	-0.0074	-0.03	-0	-0.04	-0.09	-0.09	0.02	0.9012	1

Note: Quadratic Gap shown for this correlation table. Mkt is average monthly value weighted return on the market

Both high and low book-to-market portfolio returns have strong positive correlation with the market return across both countries, with low book-to-market portfolios having stronger correlation that high book-to-market portfolios. In Canada, we see correlations of 94% and 87% respectively for the growth portfolio and value portfolio. It's interesting that for both United States and Canada, the correlation between the value premium and market is negative 20%. This

supports the countercyclical nature of the value premium, and so we expect the value premium to go up when the market goes down. The correlation between the United States and Canadian output gap is .9, this high correlation between the levels of production in both countries lends evidence to the interplay between the markets. In order to understand the dynamic nature of the value premium, I present a decomposition of the return of the HML portfolio over different economic scenarios in Table 3.

Table 3: Value Premium

		HML	
		Canada	United States
	Mkt>0	-0.2476	-0.1531
		(4.6986)	(2.7617)
	Mkt<0	1.0194	0.9752
		(4.7369)	(3.1579)
United Sates Mean			
Quadratic	Gap>Mean	-0.0126	0.4534
		(5.9572)	(3.4028)
	Gap<Mean	0.4749	0.1918
		(3.5298)	(2.5953)
Linear	Gap>Mean	0.0062	0.3378
		(5.5109)	(3.1762)
	Gap<Mean	0.6404	0.2590
		(3.2816)	(2.6557)
Canada Mean			
Quadratic	Gap>Mean	0.1729	0.3652
		(5.7215)	(3.1908)
	Gap<Mean	0.3542	0.2448
		(3.4673)	(2.7383)
Linear	Gap>Mean	0.1958	0.3180
		(5.3521)	(3.1671)
	Gap<Mean	0.3827	0.2842
		(3.3797)	(2.5952)

Note: Average return shown with S.D. in parentheses. Mkt shown is average monthly value weighted market return over the sample period.

Here we analyze the differences in the persistence of the value premium under different economic and market conditions. By looking at the premiums in up and down markets, I see that the value premium for both the United States and Canada is higher in the down market than in the up market. It's interesting to point out that the average return of the HML portfolio in the down market is higher for Canada than for the United States. This is in contrast to the full period mean, where we saw that the average value premium is higher in the United States than in Canada.

Further evidence of the predictability of value premiums with output gap is provided by the looking at the mean of the value premium conditioning on the average value of output gap. We see that the value premium is higher in both countries when output gap is below its mean level, and that the average value premium goes down when output gap is lower than its mean value. This lower variation provides evidence that we should see better predictive power of output gap in down markets due to the pro-cyclical movement with the market.

CHAPTER IV

RESULTS

We estimate, (equation (3)) by Ordinary Least Squares (OLS) for each portfolio separately.

The results of our full period OLS regression estimation of 3 United States portfolios of low book-to-market, high book-to-market and the HML are reported in Table 4.

Table 4: United States Full Period Results

	United States Full Period					
	(1)	(2)	(3)	(4)	(5)	(6)
	Low	**High**	**HML**	**Low**	**High**	**HML**
Canada	-6.78*	-6.09*	0.70			
Gap	(3.77)	(3.26)	(2.05)			
USA				-6.46	-6.17*	0.29
Gap				(4.06)	(3.50)	(2.20)
_cons	0.94***	1.25***	0.31**	0.96***	1.26***	0.31**
	(0.26)	(0.23)	(0.14)	(0.26)	(0.23)	(0.14)
N	444	444	444	444	444	444
AIC	2772.32	2642.37	2230.88	2773.02	2642.77	2230.98
BIC	2780.51	2650.57	2239.08	2781.21	2650.96	2239.17
rmse	5.48	4.73	2.98	5.48	4.73	2.98

Note: Standard errors in parentheses
="* p<0.10 ** p<0.05 *** p<0.01"

The results in each column indicate the estimated regression coefficients on output gap which can potentially serve as a predictor of growth, value and HML portfolio returns. In the United

States, the slope is significant at the 10% level for value portfolios with United States gap as well as for the growth portfolio with Canadian output gap. The lack of a clear trend in predictability points to lack of suitability of output gap in the full period.

The results of our full period OLS regression estimation of Canadian low book-to-market, high book-to-market and the HML portfolio are reported in Table 5.

Table 5: Canadian Full Period Results

	Canadian Full Period					
	(1)	(2)	(3)	(4)	(5)	(6)
	Low	**High**	**HML**	**Low**	**High**	**HML**
Canada	-0.11	-2.85	-2.74			
Gap	(4.57)	(4.21)	(3.27)			
USA				2.54	-3.86	-6.40*
Gap				(4.91)	(4.52)	(3.50)
_cons	0.83***	1.06***	0.24	0.85***	1.06***	0.22
	(0.32)	(0.29)	(0.23)	(0.32)	(0.29)	(0.23)
N	444	444	444	444	444	444
AIC	2942.77	2869.61	2645.17	2942.50	2869.34	2642.54
BIC	2950.96	2877.80	2653.36	2950.69	2877.53	2650.73
rmse	6.64	6.11	4.75	6.64	6.11	4.73

Standard errors in parentheses
="* p<0.10 ** p<0.05 *** p<0.01"

In the full period Canadian results, the value and growth portfolios are not significant as shown in the United States full period. The United States gap shows predictive power for Canadian HML at the 10% level, this result yields some evidence to importance of United States industrial production as part of the overall measure of aggregate risk in the Canadian market.

We then evaluate the amount of causality in the segmented market using equation (4) for each portfolio separately.

The results of our segmented OLS regression estimation of United States low book-to-market, high book-to-market and the HML portfolios are reported in Table 6.

Table 6: United States OLS Results – Segmented Market

	OLS United States Premiums					
	(1)	(2)	(3)	(4)	(5)	(6)
	Low	**High**	**HML**	**Low**	**High**	**HML**
USA Up	-6.14	-11.16**	-5.02*			
	(5.08)	(4.37)	(2.73)			
USA Down	-7.03	2.61	9.63***			
	(6.72)	(5.78)	(3.61)			
Canada Up				-7.20	-9.80**	-2.60
				(4.72)	(4.07)	(2.55)
Canada Down				-6.06	0.35	6.40*
				(6.20)	(5.34)	(3.35)
_cons	0.96***	1.28***	0.32**	0.94***	1.26***	0.32**
	(0.26)	(0.23)	(0.14)	(0.26)	(0.23)	(0.14)
N	444	444	444	444	444	444
AIC	2775.01	2641.13	2222.49	2774.30	2642.06	2228.28
BIC	2787.30	2653.42	2234.78	2786.59	2654.35	2240.57
rmse	5.49	4.72	2.95	5.48	4.73	2.97

Note: Standard errors in parentheses
Estimated using Quadratic Gap
* p<0.1 ** p<0.05 *** p<0.01"

In each column, the slope coefficients for the output gap are shown for both up and down markets. For the United States, Table 6 shows that output gap slope coefficient is significant at

the 10% level in the up market and significant at the 1% level in the down market. This higher rate of significance in the down market is expected due to the clear upward trend in value premium and the dramatic fall in output gap during economic recessions. As for Canadian output gap as a predictor of United States premiums, we see that the corresponding slope is significant in the down market at the 10% level of significance. This lack of predictability of the Canadian gap for United States premiums yields evidence to the fact that the United States financial markets are not highly reactive to changes in Canadian aggregate economic conditions.

Looking separately at the regression of the low and high book-to-market portfolios, we see that output gap does not perform as well at predicting these value and growth indices. In the up market the output gap is significant at the 5% level for high book-to-market portfolio, but it is insignificant in the down markets. This result was anticipated because we don't see the uptick in value and growth stocks individually in the down markets as we see with the value premium (HML).

The results of our segmented market OLS regression estimation for Canadian low book-to-market, high book-to-market and HML portfolios are reported in Table 7.

Table 7. Canadian OLS Results – Segmented Market

	OLS Canada Premiums					
	(1)	(2)	(3)	(4)	(5)	(6)
	Low	**High**	**HML**	**Low**	**High**	**HML**
USA Up	4.72	-12.19**	-16.91***			
	(6.14)	(5.62)	(4.30)			
USA Down	-1.28	10.81	12.09**			
	(8.14)	(7.44)	(5.70)			
Canada Up				-0.23	-11.93**	-11.71***
				(5.72)	(5.22)	(4.03)
Canada Down				0.10	12.90*	12.81**
				(7.52)	(6.86)	(5.29)
_cons	0.84**	1.09***	0.25	0.83***	1.09***	0.26
	(0.32)	(0.29)	(0.22)	(0.32)	(0.29)	(0.22)
N	444	444	444	444	444	444
AIC	2944.15	2865.22	2628.15	2944.77	2863.25	2633.60
BIC	2956.44	2877.51	2640.44	2957.05	2875.54	2645.89
rmse	6.64	6.08	4.65	6.65	6.06	4.68

Note: Standard errors in parentheses.
Estimated using Quadratic Gap.
* p<0.1 ** p<0.05 *** p<0.01"

Looking at the estimation results for the Canadian portfolios, I see similarity with the United States. There are however a few significant differences from the United States results. As in the case of the United States the results show output gap is significant in the down market for HML, however we can see that the Canadian value premium is highly significant in up and down markets for both Canadian as well as United States output gap. It's also shown that the Canadian value premium is more sensitive to changes in output gap in the up market rather than the down market. This difference is likely attributed to the differences in investment

strategies in the United States and Canada. Canadian investment banks traditionally are more conservative in terms of the amount of risk they are willing to take and thus the risk of the value premium in down markets is on average lower than that of the United States.

Likely the most interesting conclusion from the estimation of Canadian regressions is the evidence of the reactivity of the Canadian market to United States industrial production. Output gap is defined as the difference between the actual level of industrial production and the theoretical level of industrial production and is thus an important macroeconomic indicator. From the Canadian results, we see that the United States output gap is a very significant predictor of Canadian value premiums, but it was not the case for the predictability of the United States value premium with Canadian gap. This reactivity of the Canadian market to United States industrial production is expected but is not always easy to quantify. A probable major contributor to this interplay of the markets is the cross-listed Canadian stocks that are listed both on the Toronto Stock Exchange (TSX) and the United States stock exchanges such as NYSE, NYSE ALTERNEXT, and NASDAQ. As of March 14th 2014, there are approximately 200 companies cross-listed in the United States and Canadian markets[4]. Additionally, it's important to note that a large percentage of the Canadian stocks that are cross-listed are in the production of natural resources such as oil and forestry. Since output gap is estimated using industrial production, we see that these Canadian companies could play a significant role on the interplay between the United States and Canadian spread in value and growth stocks.

[4] "Cross-listed International stocks, another investing alternative" - http://www.schwab.com/public/schwab/nn/articles/Cross-Listed-International-Stocks-Another-Investing-Alternative

CHAPTER V

CONCLUSION

In this paper, I show that a simple measure of output gap is a valuable predictor of the value premium in North American financial markets. This is due to the pro-cyclical movement in output gap and the countercyclical movement in value premium. I use monthly return data of broadly defined value and growth portfolios from both the Canadian and United States financial markets. I use simple OLS regression to show that output gap is a valuable predictor of the value premium in North American financial markets. The information provided in this analysis assists investors in constructing value portfolios that achieves higher returns as well as act as a hedge against periods of economic recession. The output gap can be used to forecast the return on the future value premium and thus contains important information about the possible value investment strategy.

I also use both Canadian and American data to make conclusions about the reactivity of the Canadian financial markets to United States industrial production. United States output gap is determined to be a valuable predictor of the value premium in Canadian markets, whereas Canadian output gap is not significant for predicting the United States counterpart. The resulting interpretation is that the level of risk in the Canadian financial markets is influenced by the level of industrial production in the United States. The conclusion that there is a connection between possible investment strategies on aggregate economic conditions in North American significantly adds to the literature.

REFERENCES

Asness, Clifford S. and Moskowitz, Tobias J. and Pedersen, Lasse Heje, “Value and Momentum Everywhere”. *Chicago Booth* Research Paper (2012) No. 12-53.

Banz, Rolf W. “The Relationship Between Return and Market Value of Common Stocks,” *Journal of Financial Economics* 9 (1981): 3-18.

Bondt, Werner F. M. De, and Richard H. Thaler. "Further Evidence on Investor Overreaction and Stock Market Seasonality." *The Journal of Finance* 42.3 (1987): 557.

Chen, Nai-Fu, and Feng Zhang. "Risk and Return of Value Stocks." *The Journal of Business* 71.4 (1998): 501-35.

Cochrane, John H. "Financial Markets and the Real Economy." *The International Library of Critical Writings in Financial Economics* Series 18 (2006): 648.

Cooper, Ilan, and Richard Priestley. "Time-Varying Risk Premiums and the Output Gap." *Review of Financial Studies* 22.7 (2009): 2801-833.

Fama, Eugene F., and Kenneth R. French. "Business Conditions and Expected Returns on Stocks and Bonds." *Journal of Financial Economics* 25.1 (1989): 23-49.

Fama, Eugene F. and French, Kenneth R., A Five-Factor Asset Pricing Model (September 2014). Fama-Miller Working Paper.

Fama, Eugene F., and Kenneth R. French. "Common Risk Factors in the Returns on Stocks and Bonds." *Journal of Financial Economics* 33.1 (1993): 3-56.

Kothari, S.p., and Jay Shanken. "Book-to-market, Dividend Yield, and Expected Market Returns: A Time-series Analysis." *Journal of Financial Economics* 44.2 (1997): 169-203.

Lakonishok, Josef, Andrei Shleifer, and Robert W. Vishny. "Contrarian Investment, Extrapolation, and Risk." *The Journal of Finance* 49.5 (1994): 1541

Merton, Robert C. "An Intertemporal Capital Asset Pricing Model." *Econometrica* 41.5 (1973): 867.

Petkova, R., and L. Zhang. "Is Value Riskier than Growth?" *Journal of Financial Economics* 78.1 (2005): 187-202.