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The behaviour of small cap vs. large cap stocks in recessions and recoveries: Empirical evidence for the United States and Canada

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ABSTRACT

This paper examines the relative performance of small-caps vs. large caps surrounding periods of peaks and troughs of economic activity, and reexamines the relationship between the small firm anomaly and the business cycle. Small-cap firms outperform large caps over the year subsequent to an economic trough. In the year prior to the business cycle peak, however, small caps tend to lag. US style based large caps perform better over peaks, but there is no dominant category across size and book to market asset classes over troughs. The US small cap premium is related to default risk, although recessions per se do not on average impact on this premium. Default risk and the inflation risk differential between Canada and the US significantly impact on the Canada–US equity premium. Abnormal positive performance observed for US small caps in the recent (post 2001) period as well as for the long horizon is attributable to the small cap growth cohort. Canadian small firm stocks also exhibit significantly positive performance in the post 2001 period.

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1. Introduction

A standard presumption of the efficient markets paradigm in finance is that stock market returns reflect anticipated cash flows of firms in the economy. One of the early challenges to the efficient markets paradigm is the small firm (small cap) anomaly. The essence of this anomaly is that for long term holding periods, small cap stocks outperform large cap stocks (e.g., Banz, 1981; Hawawini & Keim, 1999; Reinganum, 1981; Siegel, 1998). Dimson and Marsh (1999) state that the striking outperformance of small cap companies is "the premier stock market anomaly" that is inconsistent with market efficiency. Bhardwaj and Brooks (1993), Horowitz, Loughran, and Savin (2000) and Schwert (2003) challenge the small-firm anomaly, however. Based on returns that extend to the 1982–2002 period, Schwert concludes (2003, p. 943) the "small-firm anomaly has disappeared since the initial publication of the papers that discovered it." The issue of small stock outperformance remains a topic of debate across countries. More recently, Switzer and Fan (2007) show that the high returns to small caps may be country dependent, and demonstrate the benefits of adding Canadian small caps for international investors in enhancing their risk-return performance.

Kim and Burnie (2002) suggest that the time-varying nature of the firm size effect may be attributable to the business cycle. They study returns over the period 1976–1995, asserting that differentially higher returns for small cap firms relative are observed during economic expansion phases. Small firm underperformance is shown to occur in their sample over economic contractions. They postulate that this may be due to the relatively lower productivity and high financial leverage during downturns (Chan & Chen, 1991; Kim & Burnie, 2002).[2] Switzer and Tang (2009) note that small-cap firms provide a significant nexus for entrepreneurship and innovation and hence might be viewed as less prone to governance problems than large firms; this could in part explain the superior performance of small-cap firms, although leverage, which may be exacerbated during downturns, may hinder their performance.[3]

This paper provides new evidence on the small cap anomaly for the US and Canada extending the sample to include the most recent recessionary period, which dates the trough of the worst post World War II recession as occurring in June 2009.[4] In addition, new evidence is put forth to identify whether the differential returns for small firms vs. large firms are due to the state of the business cycle per se, as asserted by Kim and Burnie (2002) or due to uncertainty factors including default risk, interest rate risk, and inflation risk that may be distinct from business cycle effects for small cap vs. large cap firms. The paper also explores the performance of the Canada vs. US stock premium as a small-country vs. large country variant of the small firm anomaly over the business cycle. Various determinants of the Canada–US equity premium are also examined including the role of changing institutional factors, such as the Canada–US Free Trade Accord (FTA)and the approval of the Multi-Jurisdictional Disclosure System, which enhances the integration of the markets (see e.g., Doukas & Switzer, 2000).

The organization of the remainder of the paper is as follows. Section 2 describes the data. Section 3 revisits the small cap premium in the U.S. and provides some new evidence for a small cap premium for the Canadian market. As is shown therein, it is apparent that the announcement of the death of the small firm anomaly seems premature based on the post 2000 period, in particular for small cap value firms as well as for the experience of Canadian small firms. Section 4 looks at business

[2] This argument has also appeared in the popular financial press. As reported by an analyst in the *Financial Times* (Handy Caps, May 26, 2009, p. 12): "The final stages of a boom, though, are an inauspicious time to own small companies. As the economy slows, they are often the first to feel the pinch: small businesses tend to be biased towards cyclical industries and mostly do not have the luxury of international diversification. Also, as bull markets near their apex, inflows from naïve retail investors may be concentrated in the largest, most liquid shares. True to form, small caps began to underperform the broader US market just as the housing bubble peaked. From April 2006 to the end of 2008, they shed 32 per cent of their value compared with just 24 per cent for large stocks. Conversely, much of small stocks' historical edge comes from outperforming early in any recovery. . ."

[3] Switzer and Tang (2009) support the paradigm of entrepreneurial CEO's whose ownership in such firms is optimally aligned with performance. However, suboptimal deployment of debt is observed in their sample. In particular, excess leverage is observed which significantly reduces firm value. This is consistent with the view that debt reduces the entrepreneurial capacity of firms, by hindering the firm's ability or willingness to compete aggressively, particularly against well-financed competitors.

[4] See the National Bureau of Economic Research (NBER) announcement on September 20, 2010: http://www.nber.org/cycles/sept2010.html.

cycle effects on the U.S. and Canadian small cap premia. In this section explores various risk factors apart from recessions per se as explanatory variables as determinants of the small firm premium. In addition, event study results for differential responses of firms by market capitalization for NBER announcements of recessions and recoveries are presented.

Section 5 looks at the U.S. vs. Canadian stock premium as a large country vs. small country variant of the small cap anomaly.

The paper concludes in Section 6.

2. Data description

The small cap portfolio returns for the U.S. are based on monthly returns on the Ibbotson/DFA small stock portfolio, which is available from January 1926. The U.S. large cap portfolio from Morningstar/Ibbotson is the S&P 500. The U.S. market portfolio proxy is the CRSP value weighted portfolio of NYSE, AMEX and NASDAQ stocks, which is available since 1926. The Dow Jones Industrial Average (from 1900 on) is also used as a reference for the US market. The US risk free rate is the 1 month T-bill rate, from WRDS. For the series, the only continuous extant proxy for Canadian small firms is Nesbitt Burns Small Cap Index, which is available since producing a benchmark series in January 1987. The Canadian Index combines the S&P/TSX Index with the Switzer Canadian Century Index, as reported in Dimson, Marsh, and Staunton (2002). The US risk factors are obtained from Morningstar EnCorr. Default risk (bond default premium) is measured by the geometric difference between total returns on long-term corporate bonds and long-term government bonds. Term structure risk (bond horizon premium) is measured by the geometric difference between Government Long Bond and Treasury Bill Returns. Inflation is based on the US consumer price index. The Canadian Consumer Price Index is obtained from the Bank of Canada, while the US/Canadian dollar exchange rate is from the Wall Street Journal.

The business cycle peaks and troughs are based on the National Bureau of Economic Research (NBER) dates. While a recession is usually defined as the reduction of a country's gross domestic product (GDP) for at least two quarters, the NBER as well as policymakers in Canada follow a more complex identification process that in various cases can conflict with the two quarter GDP rule.[5] The NBER has declared twenty-two recessions since 1900, with an average duration of about 14 months. The most marked of these is the Great Depression – from August 1929 to March 1933, a period of 43 months. Since the end of World War II, the latest 2007 recession, with a duration of eighteen months, is the most severe.[6] The Canadian economy moves somewhat in tandem with the US market, and several US recessions overlap closely with Canadian recessions. However, the most recent recessionary episode in Canada was much milder and of shorter duration than in US.[7] Table 1 lists the recession episodes of recession for both Canada and the US since World War II.

3. The small stock premium anomaly revisited

Is the small stock anomaly dead? Table 2 below shows that for the 84-year holding period beginning in 1926, the small cap premium, as captured by the geometric difference between the Ibbotson small

[5] As noted by Cross (2009), in both 2001 and 2008, the NBER identified recessions without back-to-back declines in GDP, as did Statistics Canada in 1975. See Cross (2009) and the references cited therein. The Bank of Canada is responsible for announcing the official recession beginning and end date; this is done in coordination with various official parties including Statistics Canada since 1981. As in the US, the officially announced recessions in Canada do not follow the two quarter GDP contraction rule, but a combination of factors including employment, industrial growth and others. This paper focuses on ex post recession turning points that are reported by NBER with considerable lag. Of course building a profitable investment strategy based on these results can be enhanced by developing a predictive model for recession turning points. The few studies that have appeared in this vein (e.g., Atta-Mensah & Tkacz (1998); Estrella & Mishkin, 1996, 1998; Leamer, 2008) have been largely inconclusive, and hence the topic remains an important area for future research.

[6] The average duration of the other post WWII recessions is 10 months.

[7] Statistics Canada announced a similar end date to the Canadian recession (Summer 2009). In this "technical recession," the Canadian economy contracted over three quarters, which was much milder and of shorter duration than the US recession as well as Canada's previous two recessions: http://www.statcan.gc.ca/pub/11-010-x/2010004/part-partie3-eng.htm.

Table 1
Business cycle peaks and troughs (since World War II) as identified by NBER and the Bank of Canada/Statistics Canada.

Canada		US		Description
Peak	Trough	Peak	Trough	
September-47	March-48	February-45	October-45	Demobilization
February-49	July-49	November-48	October-49	Economy adjusting to peace-time production
June-51	December-51			
April-53	April-54	July-53	May-54	Post-Korean war demobilization; inflation, restrictive monetary policy
April-57	January-58	August-57	April-58	Monetary tightening, world recession, high US dollar
February-60	March-61	April-60	February-61	Restrictive monetary policy, industrial adjustments
March-70	June-70	December-69	November-70	Restrictive monetary policy
January-75	March-75	November-73	March-75	OPEC quadrupling oil prices, Insolvency of the Franklin National Bank
February-80	June-80	January-80	July-80	Doubling Oil Prices,
July-81	October-82	July-81	November-82	Iranian Revolution
April-90	Apr-92	July-90	March-91	Iraq invades Kuwait, Oil prices soar
		March-01	November-01	Dot-Com Bubble
December-08	June-2010	December-07	June-07	Credit crunch, real estate, banking crash

Source: Statistics Canada and NBER.

cap portfolio return and the S&P 500 has amounted to over 2.03% per year. There is some variability over the decades, it is most noticeable during the 1976–1982 period where it stood at 20.33% on an annualized basis.

Panel B of Table 1 provides estimates of the Jensen (1968) alpha performance regression using the excess of the Morningstar/Ibbotson U.S. Small Company Portfolio (RS_t) over the US risk free rate, proxied by the one month T-bill rate (RF_t) as the dependent variable; the independent variables consist of a constant and the excess of the CRSP value weighted portfolio of NYSE, AMEX and NASDAQ stocks benchmark market index (RM_t) over the one month treasure bill as the risk free rate (RF_t); ε is the random error term.

$$RS_t - RF_t = \alpha + \beta(RM_t - RF_t) + \varepsilon_t$$

The intercept of the regression measures the Jensen (1968) α, shows the difference between the monthly return of the small cap portfolio and the Capital Asset Pricing Model. Consistent with Schwert, there is some time variation in the estimate of α. Consistent with Schwert (2003), while economically and statistically significant in the 1976–2002 period, over the following decade this effect disappears. However, the small stock premium reappears again in the post 2000 period, and α is again significant at the 5% level.

To probe further into these results, we look at whether the small firm effect is associated with time varying investment style (Arshanapalli, Switzer, & Panju, 2007). Panels C and D show the Jensen (1968) alpha regressions for the Fama/French small-cap value and small-cap growth portfolios respectively. Positive and significant alphas are observed for the long period estimates (1927–2010), as well as for the 1976–1982 and post 2000 periods significant alpha is observed for the small-cap value portfolio. The small cap growth portfolio, however is only significant in the 1976–1982 period. Hence, investment style does affect the abnormal returns to small-cap firms.

Table 3 below shows the analogous Canadian small stock premia, and performance tests against the CRSP benchmark. Similar to the US small cap portfolio, the BMO Nesbitt Burns proxy for Canadian small caps does not outperform its reference large cap market index over the period 1987–2000. However,

Table 2
The small cap premium in the US.

Panel A. Annualized holding period returns for US small firms vs. large firms, July 1926–August 2010; the Small Firm Index is the Ibbotson Associates/DFA small stock. Portfolio. The Large Cap Index is the S&P 500.

	Small Cap Index	Large Cap Index	Small stock premium
1926–1950	9.06%	7.71%	1.35%
1951–1975	10.62%	10.30%	0.32%
1976–1982	32.38%	12.05%	20.33%
1983–2000	12.53%	16.63%	-4.1%
2001–2010	0.40%	8.14%	7.74%
1926–2010	11.81%	9.78%	2.03%

Panel B. Small firm Jensen (1968) alpha performance regressions.
Jensen (1968) alpha performance regression of the Morningstar/Ibbotson U.S. Small Company Portfolio (RS_t) using the CRSP value weighted portfolio of NYSE, AMEX and NASDAQ stocks (RM_t) as the benchmark market index, and the U.S. one month treasure bill as the risk free rate (RF_t); ε is the random error term. The intercept of the regression measures the Jensen (1968) alpha, shows the difference between the monthly return of the small cap portfolio and the Capital Asset Pricing Model.
$RS_t - RF_t = \alpha + \beta(RM_t - RF_t) + \varepsilon_t$

	Estimated coefficient		
	α	β	R^2
1926–1950	0.0025	1.5138***	0.8059
t-Statistic	0.7669	34.8062	
1951–1975	0.0001	1.1526***	0.7186
t-Statistic	0.3312	27.5880	
1976–1982	0.0123***	1.2849***	0.7368
t-Statistic	3.1201	15.1504	
1983–2000	−0.0017	1.0278***	0.6381
t-Statistic	0.7181	19.4233	
2001–2010	0.0056**	1.1442***	0.7896
t-Statistic	2.0151	20.6858	
1926–2010	0.0017	1.3420***	0.7556
t-Statistic	1.2963	55.8224	

***Indicates significance at .01 level.
**Indicates significance at .05 level.

Panel C. Small Cap Value Portfolio Jensen (1968) alpha performance regressions, July 1927–August 2010
Jensen (1968) alpha performance regression of the US Small Cap Value Portfolio (Fama/French/IbbotsonPortfolio) (RS_t) using the CRSP value weighted portfolio of NYSE, AMEX and NASDAQ stocks (RM_t) as the benchmark market index, and the U.S. one month treasure bill as the risk free rate (RF_t); ε is the random error term. The intercept of the regression measures the Jensen (1968) alpha, shows the difference between the monthly return of the small cap value portfolio and the Capital Asset Pricing Model
$RS_t - RF_t = \alpha + \beta(RM_t - RF_t) + \varepsilon_t$

	Estimated coefficient		
	α	β	R^2
1926–1950	0.0034	1.5432***	0.8188
t-Statistic	1.0305	35.5657	
1951–1975	0.0024	1.1152***	0.7294
t-Statistic	1.4783	28.3451	
1976–1982	0.0119***	1.0685***	0.7292
t-Statistic	3.5990	14.8584	
1983–2000	.001089	.8758***	0.6891
t-Statistic	0.6162	21.7802	
2001–2010	0.0181***	1.14722***	0.7351
t-Statistic	2.5100	17.7896	
1927–2010	0.0032**	1.3471***	0.7575
t-Statistic	2.4036	55.7752	

***Indicates significance at .01 level.
**Indicates significance at .05 level.

Table 2 (*Continued*)

Panel D. Small Cap Growth Portfolio Jensen (1968) alpha performance regressions, July 1927–August 2010. Jensen (1968) alpha performance regression of the US Small Cap Growth Portfolio (Fama/French/IbbotsonPortfolio) (RS_t) using the CRSP value weighted portfolio of NYSE, AMEX and NASDAQ stocks (RM_t) as the benchmark market index, and the U.S. one month treasure bill as the risk free rate (RF_t); ε is the random error term. The intercept of the regression measures the a, shows the difference between the monthly return of the small cap growth portfolio and the Capital Asset Pricing Model.

$RS_t - RF_t = \alpha + \beta(RM_t - RF_t) + \varepsilon_t$

	Estimated coefficient		
	α	β	R^2
1927–1950	0.0021	1.2638***	0.8406
t-Statistic	.8360	38.4314	
1951–1975	−.0020	1.2707***	0.7513
t-Statistic	−1.1549	30.0058	
1976–1982	0.0067**	1.3779***	0.8601
t-Statistic	2.4291	23.2301	
1983–2000	−.0055**	1.3444***	0.6996
t-Statistic	−2.0681	22.3264	
2001–2010	0.0012	1.2157***	0.8294
t-Statistic	.4829	23.5433	
1927–2010	−.00003	1.2773***	0.8000
t-Statistic	−.3205	63.1163	

***Indicates significance at .01 level.
**Indicates significance at .05 level.

Table 3
The small cap premium in Canada.

Panel A. Annualized holding period returns for Canadian small firms vs. Canadian large firms, January 1987–August 2010; the Small Firm Index is the BMO/Nesbitt Small Stock Index. The Large Cap Index is the S&P/TSX Index.

	Small Cap Index	Large Cap Index	Small stock premium
1987–1993	5.33%	5.02%	.31%
1994–2000	10.87%	11.07%	−0.32%
2001–2010	7.31%	3.19%	4.12%
1987–2010	6.07%	5.97%	.10%

Panel B. Jensen (1968) alpha performance regression of the BMO/Nesbitt Small Company Index (RS_t) translated to U.S. dollars; the benchmark market index is the CRSP value weighted portfolio of NYSE, AMEX and NASDAQ stocks (RM_t), and the U.S. one month treasure bill is the risk free rate (RF_t); ε is the random error term. The intercept of the regression measures the Jensen (1968) alpha, shows the difference between the monthly return of the small cap portfolio and the Capital Asset Pricing Model

$RS_t - RF_t = \alpha + \beta(RM_t - RF_t) + \varepsilon_t$

	Estimated coefficient		
	α	β	R^2
1987–1993	−.0033	.752***	.4360
t-Statistic	−.775	7.962	
1994–2000	−0.0120**	.9361***	.4981
t-Statistic	2.586	9.201	
2001–2010	0.0094**	1.3027***	.6448
t-Statistic	2.125	14.388	
1987–2010	−.0014	1.033***	.5273
t-Statistic	−.530	17.738	

***Indicates significance at .01 level.
**Indicates significance at .05 level.

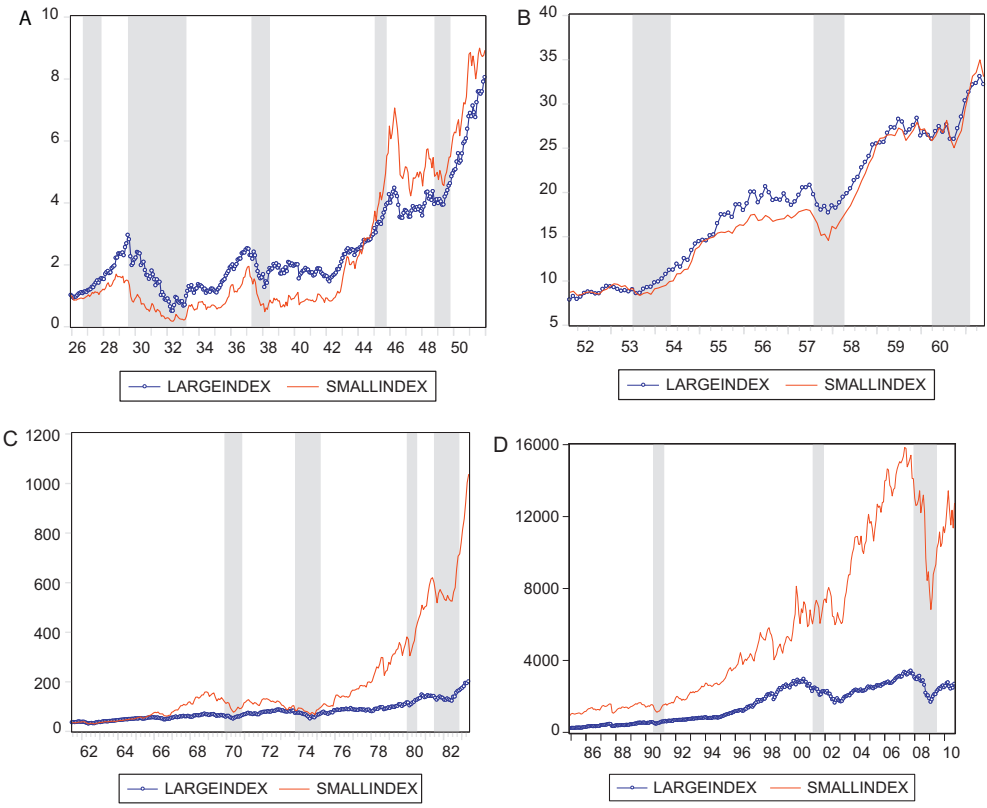

Fig. 1. US large cap vs. small cap stocks, January 1926 (=1)–January 2010; shaded areas indicate recessionary periods. Panel A. January 1926–January 1952. Panel B. January 1952–June 1961. Panel C. July 1961–November 83. Panel D. December 1983–September 2010.

an economically and statistically significant small cap abnormal return is observed when the excess return to the BMO/Nesbitt Burns portfolio (translated into US dollars) are regressed against the excess return to the CRSP value weighted portfolio for the post 2001 period.

4. The small cap premium over business cycle peaks and troughs

4.1. Differential return performance

How do small-caps vs. large caps perform over business cycle peaks and troughs over a long historical perspective? Fig. 1 plots the US small cap vs. large cap indices across all fifteen NBER recessionary episodes since 1926.

The one year market performance from the onset of these recessions is shown in Table 4.

As can be seen in Table 4, over seven of the fifteen recessionary periods since 1926, both large cap and small cap stocks appreciated in value from the onset of the recession to the end of the recession (1926, 1945, 1948, 1953,1957, 1960, 1980). However, most recessions show mixed performance at best for both small caps and large caps. In the most recent recession, from the business cycle peak in December 2007 to the trough in June 2009, the US large cap index (S&P 500) dropped 38.1%, while the US small cap portfolio fell by 40.15%.

Table 4
The Performance Small Cap Stocks vs. Large Cap Stocks Portfolios and the small cap premium in the year commencing with the onset of the recession. This table shows the one year holding period returns for the Ibbotson/DFA small cap portfolio and the large cap portfolio (S&P 500) from the month corresponding to an NBER designated economic peak (signalling the onset of the recession)..

	Small Cap Index	Large Cap Index	*S*
October 1926	20.82%	34.64%	−13.82%
August 1929	−51.04%	−23.48%	−27.56%
May 1937	−63.00%	−37.30%	−25.70%
February 1945	91.49%	43.91%	47.58%
November 1948	.23%	4.12%	−3.89%
July 1953	11.07%	27.96%	−16.89%
August 1957	8.12%	2.55%	5.57%
April 1960	25.81%	21.59%	4.22%
December 1969	−28.31%	−3.46%	−24.85%
November 1973	−27.05%	−28.83%	1.78%
January 1980	39.88%	32.42%	7.46%
July 1981	−15.17%	−11.42%	−3.75%
July 1990	−2.11%	7.39%	−9.50%
March 2001	14.05%	−9.51%	23.57%
December 2007	−40.15%	−38.10%	−2.05%

Table 5
The Performance Small Cap Stocks vs. Large Cap Stocks Portfolios and the small cap premium over recoveries. This table shows the one year holding period returns for the Ibbotson/DFA small cap portfolio and the large cap portfolio (S&P 500) from the month subsequent to an NBER designated economic trough (signalling the end of the recession).

Recession end month	Small Cap Index one-year return	Large Cap Index one-year return	Small stock premium
November 1927	47.29%	39.46%	7.83%
March 1933	296.48%	98.77%	197.72%
June 1938	27.64%	30.71%	−3.07%
October 1945	6.33%	−3.73%	10.06%
October 1949	38.41%	34.67%	3.73%
May 1954	56.73%	40.84%	15.89%
April 1958	57.47%	36.44%	21.03%
February 1961	22.67%	14.83%	7.83%
November 1970	18.07%	16.88%	1.19%
March 1975	68.13%	27.20%	40.93%
July 1980	69.67%	20.47%	49.20%
November 1982	47.19%	27.91%	19.28%
March 1991	39.63%	15.97%	23.67%
November 2001	−4.75%	−15.11%	10.36%
June 2009	23.47%	14.43%	9.04%

Table 5 below shows the behaviour of large cap and small caps over the recovery period, defined as the twelve month period subsequent to an economic trough.[8] Small-caps provide substantially higher returns than large caps over this time frame. The differential return to small caps is positive for all of these recoveries, except for the June 1938 trough, for which small caps had a one-year holding period return of 27%.

While small-caps generate relatively high returns in the year subsequent to a trough, in the year prior to the peak (i.e., the year preceding the onset of the recession), small-caps often lagged, as is shown in Table 6. While the average small-cap premium was positive (1.77%) for all NBER recessions from 1926 to 2007, in eight out of the fourteen cases for which the data are available, the annual small-cap premium is negative over the year prior to the onset of the recession.

[8] The Ibbotson small cap premium is defined as the geometric difference between the small-cap total returns and the S&P 500 which proxies as the large cap portfolio.

Table 6
The Performance Small Cap Stocks vs. Large Cap Stocks Portfolios and the small cap premium in the year prior to the onset of the recession. This table shows the one year holding period returns for the Ibbotson/DFA small cap portfolio and the large cap portfolio (S&P 500) from the month prior to an NBER designated economic peak (signalling the onset of the recession).

	Small Cap Index	Large Cap Index	Small stock premium
August 1929	15.28%	54.33%	−39.05%
May 1937	46.26%	24.82%	21.45%
February 1945	51.44%	19.60%	31.84%
November 1948	9.74%	13.43%	−3.70%
July 1953	4.31%	2.30%	2.01%
August 1957	3.31%	0.75%	2.56%
April 1960	0.60%	3.11%	−2.50%
December 1969	−19.02%	−10.60%	−8.42%
November 1973	−10.77%	0.01%	−10.78%
January 1980	43.46%	18.44%	25.02%
July 1981	69.67%	20.47%	49.20%
July 1990	−1.17%	16.40%	−17.57%
March 2001	−22.09%	−8.20%	−13.89%
December 2007	−3.64%	7.72%	−11.36%

4.2. Business cycle turning points and other risk determinants of the small cap premium

How does the small-cap premium behave over the business cycle? Kim and Burnie (2002) assert that the small firm effect is only observed during business cycle expansions, and not contractions. However, they do not directly account for differential risk exposures that firms may face that have been postulated to be significant factors affecting the returns to firms (e.g., Chen, Roll, & Ross (1986); Ferson & Harvey, 1991) and that may work apart from the state of the business cycle per se in affecting the return differential between large cap and small cap firms. This paper looks at three such risk exposures: default risk (DEF), term structure risk (TERM), and inflation risk (INFLATION). Default risk or the bond default premium, again measured by the long term corporate to government yield spreads (DEF). A positive default risk premium is consistent with investors' desire to hedge against unanticipated increases in the aggregate risk premium induced by an increase in uncertainty in the economy (Ferson & Harvey, 1991). In Fama and French (1995), the small firm premium is a proxy for a default risk state variable. Vassalou and Xing (2004) show that default risk does affect the Fama and French (1995) size and book to market factors. Beck and Demirguc-Kunt (2006) assert that small and medium size firms are more exposed to default risk due to their lack of capital and liquidity compared to large firms.

Term structure risk is also included as a possible determinant of the small cap premium. A rising term reflects an increase in riskiness of longer term assets, which may be require a separate premium for small caps firms to the extent that they are more exposed to leverage risk than large cap firms.

Inflation risk has been attributed as a significant factor in adversely affecting stock returns, and in the asset allocation (e.g., Bekaert, 2009; Boudoukh & Richardson, 1993; Fama, 1981; Katzur & Spierdijk, 2010). To the extent that small firms operate in more competitive environments, they may have less pricing power than larger firms, and hence may be more exposed to inflation risk, and hence command an inflation premium relative to larger firms.

Table 7 reports the results of regression tests for the period 1926–2010 of the model:

$$\mathrm{SML}_t = \alpha_0 + \alpha_1 \mathrm{DEF}_t + \alpha_2 \mathrm{TERM}_t + \alpha_3 \mathrm{INFLATION}_t + \sum_{i=1}^{15} \delta_i \mathrm{DUM}_{it} + \varepsilon_t \quad (1)$$

where SML is the small cap premium, DEF is default risk (bond default premium), TERM is term structure (bond horizon risk), INFLATION is the monthly inflation rate (consumer price index), REC_i is a dummy variable for the recession episode i, $i = 1, 15$, REC_i is a dummy variable for the recession episode i, $i = 1, 15$: REC1 1926–1927 Recession; REC2 1929–1933 Recession; REC3 1937–1938 Recession; REC4 1945 Recession; REC5 1948–1949 Recession; REC6 1953–1954 Recession; REC7 1957–1958 Recession; REC8 1960–1961 Recession; REC9 1969–1970 Recession; REC10 1973–1975 Recession; REC11 1980

Table 7
Determinants of the US Small Cap Premium. This table reports the results of regression tests using monthly data for the period January 1926–August 2010 of the model:.

$$(1) SML_t = \alpha_0 + \alpha_1 DEF_t + \alpha_2 TERM_t + \alpha_3 INFLATION_t + \sum_{i=1}^{15} \delta_i DUM_{it} + \varepsilon_t$$

where SML is the Ibbotson/DFA small cap premium, DEF is default risk (bond default premium), TERM is term structure (bond horizon risk), INFLATION is the US monthly inflation rate (consumer price index), REC_i is a dummy variable for the months corresponding to recession episode i, $i = 1, 15$: REC1 1926–1927 Recession; REC2 1929–1933 Recession; REC3 1937–1938 Recession; REC4 1945 Recession; REC5 1948–1949 Recession; REC6 1953–1954 Recession; REC7 1957–1958 Recession; REC8 1960–1961 Recession; REC9 1969–1970 Recession; REC10 1973–1975 Recession; REC11 1980 Recession; REC12 1981–1982 Recession; REC13 1990–1991 Recession; REC14 2001 Recession; REC15 2007–2009 Recession; ε_t is a random error term. The recessions are defined according to NBER reference dates.

Independent variable	Estimated coefficient	*t*-Statistic	*p*-Value
Constant	0.0004	0.1880	0.8509
FTA	−0.0027	−0.3934	0.6941
MJDS	0.0025	0.3375	0.7358
DEF	0.2216	1.8147	0.0699
TERM	0.0130	0.1916	0.8481
INFLDIFF	−0.6364	−2.5525	0.0108
REC1	0.0041	0.3348	0.7378
REC2	0.0062	0.8814	0.3783
REC3	−0.0069	−0.5667	0.5710
REC4	−0.0041	−0.2690	0.7880
REC5	−0.0005	−0.0402	0.9679
REC6	−0.0195	−1.4295	0.1532
REC7	−0.0166	−1.1019	0.2708
REC8	0.0042	0.3054	0.7601
REC9	−0.0049	−0.3716	0.7103
REC10	−0.0044	−0.3973	0.6912
REC11	0.0154	0.9052	0.3656
REC12	−0.0162	−1.4605	0.1445
REC13	0.0005	0.0284	0.9774
REC14	−0.0052	−0.3383	0.7352
REC15	0.0055	0.5151	0.6066
F-stat	2.1136	0.0043	
Obs.	1008		

Wald test for rec. dummies	Value	*p*-Value
F-statistic	1.0185	0.4318
Chi-squared	14.259	0.4306

Recession; REC12 1981–1982 Recession; REC13 1990–1991 Recession; REC14 2001 Recession; REC15 2007–2009 and ε_i is a random error term.

Based on regression tests, the small cap premium is significantly related to default risk in the economy, consistent with Vassalou and Xing (2004). While the term structure and inflation coefficients are positive, they are not significant indicating that interest rate risk and inflation risk do not differentially affect small cap vs. large cap firms. Do recessions per se affect the small firm return premium? The regression results indicate that this is not the case. Note from Table 7 that the coefficients for the recession variables are significant in only two cases: the recessions of 1937–1938, and 1969–1970 respectively. As reported in Table 7, the Wald test results that the recession coefficients are jointly equal to zero cannot be rejected.

4.3. Effects of NBER announcements of business cycle peaks and troughs across firm size

Is the market efficient across alternative size portfolios for NBER peak and trough announcements? To address this question, an event study is performed using the event date specified as the NBER peak or trough announcement. Compustat Research Insight is used to form portfolios of com-

panies listed on different indices NASDAQ, AMEX, NYSE, and TSX (for Canada) by market value as follows:

US stocks:
Micro-cap: less than $300 million
Small-cap: between $300 million and $2 billion
Middle-cap: between $2 billion and $10 billion
Large-cap: greater than $10 billion
Canadian stocks:
Micro-cap: less than $100 million
Small-cap[9]: between $100 million and $1.5 billion
Middle-cap: between $1.5 billion and $10 billion
Large-cap: greater than $10 billion

Utilities and financial sector companies are excluded from the analysis. Value-weighted portfolios are formed using randomly selected 20 stocks in each category for US and 10 stock portfolios for Canada. US company data are from CRSP, while the Canadian portfolio data are from the TSX. Daily return data are obtained for a 180 day estimation window and a 60 day event window surrounding the announcement date. The analyses are conducted for the July 1990 and March 2001 recessions using the market model approach, with the CRSP value weighted index serving as the market portfolio. To the extent that the markets are semi-strong efficient, the null hypothesis is that abnormal returns should be zero for trough announcements. Since the announcements reveal public information that pertains to an event that occurred in the past, they should not affect stock market performance. The alternative hypothesis is that market participants do not have sufficient data to confirm an economic recovery, and as such an NBER announcement regarding the arrival of a trough date will be interpreted as good news. Similarly, with semi-strong efficiency, an announcement of a business cycle peak should not be associated with abnormal returns. On the other hand, peak announcements, might be deemed as unexpected bad news. Hence, such announcements could give rise to significantly negative abnormal returns.

The results of the event studies can be summarized as follows.[10] Trough announcements do elicit significantly positive abnormal returns for small-cap, mid-cap and large cap US stocks over the event day (direct effect) and in most cases over longer event windows across most size-based categories. This is consistent with the view that an economic recovery is fraught with uncertainty, and the NBER's trough announcements provide welcome resolution of this uncertainty. On the other hand, the announcement of a business cycle peaks is viewed as a significantly negative event.

How do Canadian stocks respond to these US announcements? On the whole, not to any significant degree. For all size categories (micro cap, small cap, as well as mid and large cap stocks) across announcements of US peaks and troughs, there is little evidence of abnormal returns around the NBER announcement dates. This may reflect differential exposures to business cycle risk between countries, in part due to the differential industry composition of the markets, with Canadian markets more heavily exposed to the resource sector relative to the US market.[11]

5. The US vs. Canadian stock premium as a large country vs. small country variant of the small cap anomaly

Does the Canada–US equity premium behave in a similar manner to the US small-cap premium? One might conjecture that there should be some similarities, given the significantly smaller capitalization of the Canadian market relative to the American market. Indeed as of January 2010, the average listing on the TMX Group has a market capitalization of a conventionally defined small cap firm, at $889 billion;

[9] The S&P/TSX Small-Cap Index size criteria are used for eligibility in this group.
[10] Detailed tables are omitted in order to preserve space. They are available on request.
[11] Cross (2009) states that "Recessions in the United States have been accompanied by a wide range of outcomes in Canada." For example, while the US economy contracted significantly during 1974–1975 and 1981–1982, Canada experienced a mild and a severe recession respectively. In contrast, the mild downturns in the US in 1990–1991 and 2001 were accompanied in Canada by a severe recession in the former case and no recession in the latter.

Table 8
Annual holding period returns for US and Canadian equity markets, January 1900–August 2010. This table shows annual holding period returns for the US equity market, represented by the Dow Jones Industrial Average Adjusted Index and the Canadian market index translated into US dollars which combines the S&P/TSX Index with the Switzer Canadian Century Index, as reported in Dimson et al. (2002).

	Canadian Index	US Index	Canadian–US Premium
1900–1925	3.11%	3.37%	−0.26%
1926–1950	2.15%	1.62%	0.53%
1951–1975	4.38%	5.05%	−0.67%
1976–2000	2.76%	5.39%	−2.63%
2001–2010	6.83%	−.78%	7.61%
1900–2010	4.61%	4.65%	−.04%

Table 9
The performance of Canadian stocks vs. US stocks over twelve months commencing with the onset of the recession. This table shows the one year holding period returns from the month corresponding to an NBER designated economic peak, signalling the onset of a recession. The US Index is the Dow Jones Industrial Average Adjusted Index; The Canadian Index is translated into US dollars, and combines the S&P/TSX Index with the Switzer Canadian Century Index, as reported in Dimson et al. (2002).

	Canadian Index	US Index	Canada–US
September 1902	17.80%	−30.76%	48.56%
May 1907	−11.71%	−6.84%	−4.87%
January 1910	6.35%	−7.59%	13.94%
January 1913	−12.76%	−1.10%	−11.66%
August 1918	10.84%	−17.75%	28.59%
January 1920	−9.36%	−26.95%	17.59%
May 1923	−1.67%	−7.82%	6.15%
October 1926	33.81%	20.54%	13.27%
August 1929	−39.60%	−36.79%	−2.81%
May 1937	−24.61%	−38.33%	13.72%
February 1945	31.30%	18.51%	12.79%
November 1948	0.22%	11.89%	−11.67%
July 1953	13.48%	26.34%	−12.86%
August 1957	−2.05%	5.01%	−7.06%
April 1960	23.11%	12.80%	10.31%
December 1969	−1.42%	4.82%	−6.24%
November 1973	−27.17%	−24.76%	−2.41%
January 1980	6.53%	8.15%	−1.62%
July 1981	−38.39%	15.09%	−53.48%
July 1990	−0.52%	4.11%	−4.63%
March 2001	1.94%	5.32%	−3.38%
December 2007	−46.94%	−33.84%	−13.10%

in contrast, the average market capitalization of NYSE companies is over $4 billion. However, since the comparison is cross-border, aside from default risk and term structure risk, the potential effects of inflation differentials between countries is also examined. The long period returns for Canadian stocks and US stocks are fairly similar. As is shown in Table 8, over the period January 1900 through August 2010, the differential return between Canada and the US amounts to only .04% per year.[12]

However, Canada and the US experience dissimilar responses to NBER business cycle turning points. In many cases, the Canadian dollar depreciates in a significant manner relative to its US counterpart at the onset of recessions. The impact of currency changes is material insofar as it affects the results. For example, when exchange rate is fixed (or exchange risk is hedged completely), the Canadian market performed worse than the US market over the one year period after the onset of US recessions in only five of the fifteen NBER recessions since 1926. In Table 9 the results for an unhedged investor are shown, with the returns translated into Canadian dollars, this number increases to eleven.

Table 10
The performance of Canadian stocks vs. US stocks over twelve months commencing with the end of the recession. This table shows the one year holding period returns from the month corresponding to an NBER designated economic trough, signalling the end of a recession. The US Index is the Dow Jones Industrial Average Adjusted Index; The Canadian Index combines the S&P/TSX Index with the Switzer Canadian Century Index, as reported in Dimson et al. (2002).

	Canadian Index	US Index	Canadian–US Index
December 1900	6.86%	−8.79%	15.65%
August 1904	18.73%	47.76%	−29.03%
June 1908	14.88%	27.12%	−12.24%
January 1912	6.43%	4.40%	2.03%
December 1914	19.55%	81.66%	−62.11%
March 1919	7.91%	15.71%	−7.80%
July 1921	15.04%	41.95%	−26.91%
July 1924	14.35%	31.00%	−16.65%
November 1927	32.03%	48.01%	−15.98%
March 1933	79.65%	81.06%	−1.41%
June 1938	−2.93%	−2.42%	−0.51%
October 1945	−2.31%	−9.35%	7.04%
October 1949	27.33%	18.71%	8.62%
May 1954	23.66%	29.73%	−6.07%
April 1958	25.08%	36.83%	−11.75%
February 1961	8.74%	6.94%	1.80%
November 1970	−2.47%	4.69%	−7.16%
March 1975	8.57%	30.11%	−21.54%
July 1980	−3.51%	1.82%	−5.33%
November 1982	38.00%	22.78%	15.22%
March 1991	−4.95%	11.04%	−15.99%
November 2001	−11.06%	−9.70%	−1.36%
June 2009	18.00%	15.71%	2.29%

Table 10 shows that both indices tend to deliver high returns in the one year period after the end of US recessions, but there is some variation in the relative performance across recessions.

To what extent does the Canada–US equity premium depend on the US business cycle apart from other, potentially independent risk factors?

To address this issue, the regression model (1) for the small-cap premium is augmented to include changes in the regulatory environment that could enhance the integration of the markets, which would narrow the Canada–US equity premium. Such institutional changes could enhance the integration of the markets, which would narrow the Canada–US equity premium.[13] These include the implementation of the Canada–US Free Trade Accord (FTA), which was ratified in October 1987.[14] In addition, it overlaps with the introduction of the Multi-Jurisdictional Disclosure System (MJDS) in July 1991, which relaxed the financial reporting requirements for Canadian companies listing in the United States, the amendments to MJDS in July 1993, as well as changes in disclosure requirements for Canadian companies listed on the domestic market mandated by Canadian securities regulators in October 1993 (see Doukas & Switzer, 2000). The model estimated is:

$$\mathrm{CANPREM}_t = \beta_0 + \beta_1 \mathrm{FTA}_t + \beta_2 \mathrm{MJDS}_t + \beta_3 \mathrm{DEF}_t + \beta_4 \mathrm{TERM}_t + \beta_5 \mathrm{INFLDIFF}_t + \sum_{i=1}^{15} \delta_i \mathrm{DUM}_{it} + \upsilon_t \tag{2}$$

where CANPREM is the Canada–US equity premium (Canadian market return – Dow Jones Industrial Average Return); FTA is a dummy variable = 1 after the finalizing of the Canada–US Free Trade Accord in October 1987 and 0 otherwise; MJDS is a dummy variable = 1 after the introduction of Multi Jurisdictional Disclosure System (MJDS) in July 1991 and 0 otherwise; INFLDIFF is the difference between

[12] Note <fn0055>however that more recently (from 2001 to 2010) Canadian markets have outperformed their US market by 774 basis points per year.

[13] He and Kryzanowski (2007) assume that the US and Canadian equity markets are integrated.

[14] Martínez-Zarzosoa, Nowak-Lehmann, & Horsewood (2009) show that NAFTA had beneficial trade creation effects.

Table 11
Determinants of the Canada–US equity premium.

This table reports the results of regression tests using monthly data for the period January 1926-August 2010 of the model:

$$(2)\text{CANPREM}_t = \beta_0 + \beta_1\text{FTA}_t + \beta_2\text{MJDS}_t + \beta_3\text{DEF}_t + \beta_4\text{TERM}_t + \beta_5\text{INFLDIFF}_t + \sum_{i=1}^{15}\delta_i\text{DUM}_{it} + \upsilon_t$$

where CANPREM is the Canada–US equity premium (Canadian market return – Dow Jones Industrial Average Return); FTA is a dummy variable = 1 after the finalizing of the Canada–US Free Trade Accord in October 1987 and 0 otherwise; MJDS is a dummy variable = 1 after the introduction of Multi Jurisdictional Disclosure System (MJDS) in July 1991 and 0 otherwise; INFLDIFF is the difference between the Canadian and US monthly inflation rate (consumer price index), REC_i is a dummy variable for the recession episode i, $i = 1, 15$, REC1 1926–1927 Recession; REC2 1929–1933 Recession; REC3 1937–1938 Recession; REC4 1945 Recession; REC5 1948–1949 Recession; REC6 1953–1954 Recession;REC7 1957–1958 Recession; REC8 1960–1961 Recession; REC9 1969–1970 Recession;REC10 1973–1975 Recession; REC11 1980 Recession; REC12 1981–1982 Recession; REC13 1990–1991 Recession; REC14 2001 Recession; REC15 2007 Recession; υ_t is a random error term. The recessions are defined according to NBER reference dates.

Constant	0.0004	0.1880	0.8509
FTA	−0.0027	−0.3934	0.6941
MJDS	0.0025	0.3375	0.7358
DEF	0.2216	1.8147	0.0699
TERM	0.0130	0.1916	0.8481
INFLDIFF	−0.6364	−2.5525	0.0108
REC1	0.0041	0.3348	0.7378
REC2	0.0062	0.8814	0.3783
REC3	−0.0069	−0.5667	0.5710
REC4	−0.0041	−0.2690	0.7880
REC5	−0.0005	−0.0402	0.9679
REC6	−0.0195	−1.4295	0.1532
REC7	−0.0166	−1.1019	0.2708
REC8	0.0042	0.3054	0.7601
REC9	−0.0049	−0.3716	0.7103
REC10	−0.0044	−0.3973	0.6912
REC11	0.0154	0.9052	0.3656
REC12	−0.0162	−1.4605	0.1445
REC13	0.0005	0.0284	0.9774
REC14	−0.0052	−0.3383	0.7352
REC15	0.0055	0.5151	0.6066

Wald Test for Recession Dummies

	Value	df	*p*-Value
F-statistic	.5581	(15.988)	0.9071
Chi-squared	8.3719	150.9080	

the Canadian and US monthly inflation rate (consumer price index), REC_i is a dummy variable for the recession episode i, $i = 1, 15$ as in the previous section.

Table 11 presents empirical estimates of Eq. (2). Similar to the US small cap premium regression, a significant business default risk component is observed in the Canada–US equity premium, while the Wald test rejects the joint significance of the recession dummy variables. However, a significant inflation risk component is also observed: higher inflation in Canada relative to the US serves to reduce the returns to Canadian equities relative to their US counterparts. This result is consistent with Fama (1981), Boudoukh and Richardson (1993), Bekaert (2009), and Katzur and Spierdijk (2010). Neither the FTA nor the MJDS are found to be significantly related to the Canada–US equity premium. This suggests that the relaxation of barriers of goods and capital flows has not enhanced the integration of the markets.

6. Conclusion

This paper takes a new look at the small cap premium in Canada and the US. In contrast to various studies pronounce an end to the small cap performance anomaly, the study shows that since 2000,

economically and statistically significant abnormal performance is observed for small cap stocks in the US and Canada. The US small cap anomaly in recent years is focused on small cap value stocks. In previous decades where the small-cap anomaly is most pronounced, the anomaly is found for both small cap value as well as small cap growth stocks.

Differential performance for size based asset portfolios is found to be associated with risk factors that are distinct from business cycle turning points per se. The factors that drive differential performance across asset size classes should be of interest for future research looking at the benefits from time-varying asset allocation strategies (see e.g., Arshanapalli et al., 2007).

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